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THE NATURAL VEGETATION OF SCOTLAND: ITS CHARACTER AND DEVELOPMENT

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For upwards of forty centuries the vegetation of Scotland has been continuously modified, purposely and indirectly, by human agency, and at present it is artificial to a degree that is not always realised. So profound have been these changes that it is difficult to form an idea of the character of the vegetation as it was under purely natural conditions. In the following survey, the results of research in a number of fields have been considered, and an attempt has been made to correlate and interpret the available data.

The Habitat: Climate and Soil Factors

One of the major difficulties in making the reconstruction is to find firm starting ground. Rather than to rely upon statements made by Classical authors concerning the "Caledonian Forest," it would seem preferable to begin with an examination of some aspects of the present-day vegetation which are relevant to the study of the "natural vegetation." In the first place, Scotland lies well to the south of the northern limit of tree growth in Europe, and it is very doubtful whether any areas except the highest summits well above 2000 feet experience temperature conditions too low for trees to flourish. At first sight, this appears to confirm the statements made in some of our history-books, now considered to have been superseded, to the effect that the Romans found the country clothed to the tops of all but the highest hills with a dense "Caledonian Forest." It is now known, however, that even districts near sea-level may be treeless from purely natural causes and have been so since the remote prehistoric period. This absence of woodland can be explained in a number of ways.

Strong winds are responsible to a considerable extent for the absence of trees at high levels, and for their relative scarcity and stunted and bent condition in exposed coastal districts. The danger

of uprooting is obvious, but more important are the facts that transpiration is very greatly increased and young shoots are easily damaged, so that low-growing plants are characteristic of areas with very windy conditions. It is generally agreed that degree of exposure to strong winds, rather than low temperature, is the determining climatic factor as regards the altitudinal limit of tree growth in Scotland. This limit is of major significance in the general problem under discussion.

In the "Botanical Survey of Scotland" [1] it is stated that in the Edinburgh district deciduous trees appear throughout the cultivated area but do not grow above 800 or 900 feet on the northern slopes of the Pentlands or above about 900 or 1000 feet on the southern. Coniferous trees attain 1250 feet, and sometimes 1500 feet, though at this elevation they are stunted. In Forfar and Fife, much the same limits are to be observed, save that in the Grampians, birch (*Betula*) and rowan (*Pyrus Aucuparia*) struggle up to 1750 feet. In northern Perthshire the upper limit is still higher and a few trees are to be encountered at elevations of over 2000 feet, while the Scots pine (*Pinus sylvestris*) ascends to 1750 feet. This quite clearly reflects the importance of exposure, for the Grampians provide sheltered places at much higher altitudes than the lower and more isolated Pentlands and hills of Fife, which are also subject to sea winds. The same factor produces a lower tree limit in the North and West Highlands, where growth seems to cease at 1400 or 1500 feet in many parts, and at a still lower altitude in the extreme north-west. From these observations it has been deduced that the extreme limit of tree growth in Scotland is about 2000 feet ; but it must be pointed out that in the One-inch Ordnance Survey sheets covering the Grampians (Sheets 42, 43 and 48 of the Popular Edition), a number of instances occur in which plantations, not merely scattered birches along watercourses, reach a height of well over 2000 feet ; and in one case, in Glen Lyon, a plantation is marked at 2400 feet, though this particular wood seems to have been levelled by gales in 1927.

Wind force appears to be equally important in restricting tree growth in some coastal districts. It is true that trees in a flourishing condition are sometimes to be seen at the edge of the beach, but invariably such woodlands are on sheltered inlets, or are protected by rising ground from the prevailing winds, as, for instance, those on the east coast of Kintyre. In places exposed to the full force of gales straight from the sea, the trees, if they occur at all, are low and stunted, while the crowns are planed off by the action of the wind, the "plane," as it were, rising gradually from the shore. The west coast suffers more in this respect than the east, and it is often maintained that the treeless aspect of the Hebrides, Shetlands, and some parts of the mainland of the west coast, is due entirely to the strong westerly winds. The general truth of this is apparent from the fact that single trees appear in sheltered hollows in all

but the bleakest areas, but other factors, such as the rapidity of peat formation (to be considered later), must also be taken into account.

There is no doubt that wind force was equally important in the past in restricting the distribution of " natural " woodland. It is quite impossible, however, to estimate where or in what areal degree : local conditions vary so greatly, and other factors were also at work ; furthermore, when the natural forest had its greatest extent, struggling trees on the margins created a shelter-belt for adjacent trees which are now themselves marginal. These conditions no longer obtaining, the behaviour of an isolated specimen near the coast or at a high elevation cannot be taken without the greatest reserve as an indication of the true " natural " environment. With regard to this subject in general, it is necessary to protest against a distinction sometimes made between " woodlands " and " forest-free areas," as though the two could readily be separated by a line drawn on a map. The transition where one merged into the other must very often have been indistinct : with increasing exposure on ascending a mountain or approaching a windward coast, the trees would first disappear from the more exposed places and then become restricted to sheltered hollows or deep valleys.

Soil conditions are another factor limiting the development of woodlands. The screes and boulders at the summits of the higher mountains are obviously an unsuitable habitat, quite apart from climatic difficulties, and morasses again offer an extreme example of an unfavourable terrain ; though in both cases the aggregate area of Scotland which is affected is not great. Other unfavourable soil conditions exist in the form of shifting sand, at Glenluce, for example, in Galloway, Tents Muir in Fife, or the Culbin Sands on the Moray coast, where special precautions have to be adopted to allow the establishment of plantations. In addition there are to be considered the shallow soils, which are so common in a rugged country such as Scotland and which are inimical to tree growth because of the difficulty of root development : shallow-rooted trees in exposed positions are soon blown down. In districts where high winds are common, soil depth may be the decisive factor in prohibiting the development of woodland, but further than this it is impossible to go ; any visitor to the Highlands will have marvelled at trees growing on very thin and rocky soils, and a mountain climber can tell of others perched in seemingly impossible positions on narrow ledges or in the clefts of boulders. Patches of deeper soil frequently occur on slopes which at first sight appear almost precipitous. With regard to the " natural " vegetation, it is to be borne in mind that the indiscriminate felling of woodlands in the past has resulted in erosion and has extended the areas which have a thin covering of soil.

The constitution of the soil is of importance in relation both to possibilities of tree growth and to the nature of the vegetation

generally. It is controlled in the first place by the nature of the parent material, that is, by the rocks or glacial and fluvio-glacial deposits. One of the outstanding characteristics of Scottish soils is a marked deficiency in lime, as calcareous rocks occur only in restricted localities, and plant associations typically developed on soils with a high lime content, such as ash wood, for instance, are comparatively unimportant. On the prevalent acid soils, peat formation, which will be discussed later, is a widespread phenomenon, and has often led to the complete exclusion of woodlands.

With the relatively high rainfall and equable temperature conditions of this country, there is a strong tendency for soils to be leached ; though partial redeposition of the soluble mineral salts may take place in the lower horizons, accompanied in some cases by the formation of hard pan. In coarse gravelly and sandy soils, especially in the wetter districts, this process has been rapid, and leached or " podzolised " soils are common ; but in the more compact soils the process has been slower and may scarcely be traceable in a heavy clay. The leaching of the upper or A horizon is rarely if ever so marked or so deep as in itself to preclude tree growth ; but its reaction is unfavourable and its influence is likely to be reflected in the nature of the plant cover. It has been noticed that the establishment of plantations on soils which have been deeply leached may offer considerable difficulty.[2] The formation of a hard pan in the lower or B horizon is inimical to tree growth, as it hinders the roots from penetrating beyond the leached layers. On leached soils with pan development the present vegetation is of a moorland type. It would be most unwise, however, to conclude that this treeless aspect is " natural " in the sense that it has been characteristic of these soils since the remote prehistoric period. The true " podzol " is developed in areas of coniferous forest, and again, the destruction of the forest cover by human agency must itself have reacted upon the character of the soil. Yet this tendency towards leaching in the upper horizon must be reckoned as one factor amongst others restricting the extension of " natural " woodlands.

Soil drainage is another factor of importance. Too rapid drainage in areas of sand-dunes or scree-like material is adverse to plant colonisation, and even when conditions are much less extreme, as over sandy or gravelly soils, the natural woodlands would appear to be of a more open type than on the moister soils. In Scotland, however, with the high rainfall, cool summers, and dislocation of the drainage produced by the Ice Age, an excess of moisture is far more common, and soils where the water-table is at or near the surface (" glei " type) frequently occur. These conditions again affect the nature of the plant cover, and may react unfavourably upon tree growth. When the waterlogging is more or less permanent and the water is relatively stagnant, aeration is impossible, and the difficulties may be so great that even with

modern methods of forestry, tree growth may be slow and irregular. It seems safe to assume that natural woodlands would not develop under these circumstances, which cannot have been uncommon when the ice sheets left this country.

Closely linked with soil drainage is the formation of peat, which takes place under cool climatic conditions when the drainage is poor, and results from the incomplete decay and gradual accumulation of plant remains. Peat bogs, or mosses, as the writer prefers to call them, considered from a genetic point of view, are usually classified in three main types in accordance with the conditions resulting in soil saturation. " Topogenous bogs depend on topographical features, *e.g.* filled-up ancient lakes ; ombrogenous bogs are due to surface precipitation (' high-moors ') ; soligenous bogs are produced either by surface water flowing into the bog area from surrounding country, or by ground water rising up to the surface layers of the soil." [3] A simpler classification into " climatic " and " basin " bogs has also been suggested.[4] This accumulation of raw humus occurs sometimes as a layer only a few inches thick on top of the soil, as in some heaths, and sometimes under trees, where it is referred to as " forest peat " ; but in favourable localities, such as the Moor of Rannoch, a mantle many feet thick may be found.

The presence of peat adversely affects tree growth in a number of ways : the waterlogged condition of the soil prevents root development ; many species of trees do not flourish on such acid soils ; and the raw humus itself does not offer an adequate food supply for most species, while it may yet be thick enough to cut off the roots from the minerals in the soil below. Conditions are particularly difficult for seedlings. It should be noted, however, that some conifers, including Scots pine, can grow on peat if it is well drained. The natural vegetation of these mosses, which are very extensive taken in the aggregate, consists of low-growing heaths, grasses and sphagnum. There is no doubt that this type of vegetation long predates the deforestation of the country by human agency, yet tree stumps are found at the base of many of the peat deposits. It would appear that trees once flourished there, but that raw humus gradually accumulated under the trees and in the end led to waterlogging, a dearth of seedlings, and finally to the destruction of the woodlands.

Any attempt to map the distribution of prehistoric woodlands is at present doomed to failure at the outset. Even were a soil map of the necessary type available—which it is not—it is quite impossible to estimate the influence of such factors as the exposure to winds, or the depth of soil, in the prehistoric period. Yet it is evident, from what has been said of the reaction of tree growth to present controls, that the country was not clothed to the tops of the highest mountains with forest. We know, that is to say, that at least the deep peat deposits, the very marshy or sandy areas, the thin soils in exposed places, and the very windy coastal

areas and hill-tops did not normally support woodlands. The aggregate area is certainly a not inconsiderable percentage of the whole, but to go further would be guesswork pure and simple.

Natural Plant Associations

It is theoretically possible to postulate for each species an optimum environment as regards soil and climate, but it would be an error to suppose that we can reconstruct the original distribution of any particular plant by locating the areas where the habitat closely approaches the ideal. Many kinds of plants show a considerable range of adaptation, and allowance must also be made for the factor of competition, whereby some species may be excluded by others of more vigorous habit which deprive them of light and adversely affect soil conditions. If, however, it can be discovered from observation which species are found together in similar habitats under more or less natural conditions, some useful data concerning the character of the " natural " vegetation will be available. The list below represents a summary of what has so far been discovered by examining these " natural " associations.

In considering these groups as indicative of past conditions a number of assumptions must be borne in mind. In the first place, we are assuming that in similar habitats the same species normally played a dominant *rôle* (with the implication that seeds travelled long distances [5]), that the vegetation had had time to reach a mature stage of development, and that chance variations, such as undoubtedly take place from one locality to another, were not so great as to overshadow generalisations. Secondly we must eliminate from the reconstructed " natural " vegetation all those plants which may at present play a dominant *rôle* but which have been introduced by human agency ; the larch (*Larix*), for instance, spruce (*Picea*), fir (*Abies*), and beech (*Fagus*) amongst the trees, and, of course, all the cultivated crops and their associated weeds. It is also to be borne in mind that the classification adopted is of necessity broad. In such a country as Scotland where relief, climate and soils vary so much even within small districts, the associations in many cases cannot be sharply differentiated : " damp oakwoods " often grade into " dry oakwoods," and the latter into " oak-birch-heath," which, as its name implies, is of a heterogeneous character. Space permits only a statement of the dominant forms within these groups ; and it has not been possible to go beyond the broadest generalisations concerning the probable distribution of these associations under natural conditions, partly because of the difficulties indicated in an earlier section, partly because the map showing the nature of the present-day flora has never been completed, and partly because it would be unjustifiable to speak with any approach to finality when so many variables enter into consideration.[6]

I. Woodland Associations

(*a*) Alder-Willow Association (*Alnus* and varieties of willow (*Salix*) dominant).

This type of vegetation occurs especially on the edges of lakes and rivers on saturated soils where the water is not stagnant and where acid peat has not formed. On the slightly drier areas, oak (*Quercus pedunculata*) and ash (*Fraxinus*) are found, and under very wet conditions and in shallow water, reed swamp occurs. This association must have been common enough in this country in the past, though only in narrow strips along the lakes and rivers. Acid peat is characteristic of many badly drained areas.

(*b*) *Damp Oakwood* (*Quercus pedunculata* dominant).

These woodlands are found in lowland areas of heavy clays, where the soils are usually wet, and they grade into the alder-willow association. The area within Scotland suited to such forest is restricted, even within the Central Lowlands ; low-lying districts occupy but a relatively small part of the country, and of these, some are covered with peat, as in Flanders Moss along the Forth, while others, though mantled with glacial drift, are more sandy and gravelly than are, for instance, the clays of the Midlands or south-eastern England.

(*c*) *Dry Oakwood* (*Quercus sessiliflora* dominant).

This association develops on drier areas than the preceding form, and is found typically on well-drained slopes and on the more sandy and gravelly soils. It occurs within relatively lowland districts and rarely ascends to altitudes near the 1000 feet level ; even at elevations of over 500 feet there is often a considerable admixture of conifers, which are better adapted to withstand the more rigorous conditions, and which finally become dominant. The undergrowth does not seem to be so dense as in the damp oakwood association. Large areas within the Central Lowlands provide a suitable habitat, as well as the lower slopes of the valleys in the Southern Uplands and the Highland glens. Under natural conditions, much local variation must have occurred within the woodlands of this general type ; on the deeper, wetter soils, *Quercus pedunculata* and hybrid forms would appear, while in localities with thin, poor, sandy soils, birch (*Betula*) would be common in woodlands of a more open nature.

(*d*) *Pinewood* (*Pinus sylvestris* dominant).

Scots pine thrives under similar conditions to *Quercus sessiliflora*, but whereas the oak gradually becomes restricted to the more favoured localities at higher elevations, disappearing usually before elevations of 1000 feet, the pine has a wider range and can, moreover, flourish on well-drained peat. On the better soils, however, the oaks seem able to exclude the pines. When growing under

more or less natural conditions at the present time, as in the Forest of Rothiemurchus, the trees are often widely spaced, intermixed with some oaks and birches, and with a ground vegetation of ling (*Calluna vulgaris*). The distribution of pinewoods will be discussed in a later section, but the evidence goes to show that *Pinus sylvestris* was restricted to the higher elevations of the Grampians by the later prehistoric period.

(*e*) *Birchwood* (*Betula* dominant).

Birchwood often occurs as the dominant association on thin, poor soils, especially where there is a tendency to form hard pan, and where pine and oak cannot thrive ; localities of this nature are a common feature in many parts of Scotland within the altitudinal limits of oak and pinewoods. But birchwood is also characteristic of the higher hill slopes, above the limits reached by almost all other trees. Formerly, it must have had a wide extension in regions above about 800 to 1000 feet, and even now single trees may be encountered in sheltered places up to elevations of 2000 feet in the Grampians.

(*f*) *Oak-Birch-Pine-Heath Association* (*Quercus sessiliflora, Betula, Pinus sylvestris* and *Calluna vulgaris* co-dominants).

This is a transitional type of vegetation and is found on the poorer soils where oaks and pines have a struggle to maintain themselves. It would appear that under natural conditions there is a tendency for the birches to become dominant over the oaks and pines, and at a still further stage in the succession, especially on the poorer soils, for ling to replace the birches. This association must have been common enough in Scotland in early times on land which is now rough pasture or moorland.

In this discussion no mention has been made of ash or beech woods, though both *Fraxinus* and *Fagus* grow well in this country at the present time. All the evidence goes to show that the beech is not native to Scotland, and both are characteristic of calcareous soils which occur but locally. Ash trees in all probability were an ingredient of the mixed woodlands, but they did not form a common association.

II. Associations not dominated by trees

Below the arctic-alpine zone, the natural vegetation appears to have consisted in the main of grasses and ling (*Calluna vulgaris*) over the areas which have thin or very poor soils, or which are very much exposed to the wind ; patches of whin (*Ulex*) and juniper (*Juniperus*), especially in the south-east, also seem characteristic ; and it may be supposed that bracken (*Pterus aquilina*) was common. A similar type of vegetation appears to have occupied the very sandy areas, such as " fixed dunes." Bracken covers quite extensive areas at the present time ; but this appears to be merely

a phase in the natural regeneration, since many areas involved are suited to the growth of oak, pine or birchwood. The well-known spread of this plant is apparently a development of the last century or so, and may be related to the fact that cattle have been replaced by sheep on the rough pastures of many districts. Cattle were formerly more numerous and more important in the rural economy of many counties, and whereas sheep avoid bracken,[7] cattle were able to trample down the fronds and prevent its spreading. Again, " the destruction of heather and the overgrazing of the better areas have led to an extensive spread of mat grass (*Nardus stricta*)." [8]

The arctic-alpine zone, which occurs at elevations above *c.* 2000 feet in the Grampians, can have changed but little from its natural condition. This zone is indicated by a marked decrease in the frequency of ling (*Calluna vulgaris*), by the absence of trees, and an increase in the number of saxifrages, dwarf willows and blaeberry (*Vaccinium*), with the occurrence of species of an arctic type; among the grasses, *Festuca ovina* is common. At the summits of many of the higher peaks, the bare rocks and screes are almost devoid of vegetation except, perhaps, for mosses and lichens.

The moorland associations cover wide areas on the peat deposits and may be divided into three main types. The first is *Scirpus* moor, which appears as the climax vegetation in the west and north-west of the country, where the rainfall is high, and the relative humidity consistently great. It is dominated by deer grass (*Scirpus caespitosus*), with ling (*Calluna vulgaris*) as the co-dominant. Towards the north-east, *Calluna* moor is typically developed, with ling as the dominant, and tufted cotton grass (*Eriophorum vaginatum*) as the chief subsidiary. In the south of the country, *Molinia* moor is characteristic, and purple moor grass (*Molinia cærulea*) covers wide areas and sometimes " obliterates with its huge contiguous tussocks all other plants." [9]

Historical Aspects

A study of the factors controlling the nature of the vegetation and an examination of the character of the natural plant associations give some idea of what is sometimes referred to as the " primitive vegetation." This expression has been carefully avoided, firstly because the word " primitive " is unsuitable, since we are concerned with the plant cover no older than the Quaternary Ice Age, and secondly because there is implied in the expression the idea of an untouched, unchanging vegetation, which has been transformed from its pristine state by human agency alone. The concept of a " primeval state of nature " is so much of an over-simplification that it leads to gross misunderstanding. It has long been realised that the plant cover of any region, whether subjected to " development " by Man or not, must be studied as being " alive," changing and developing of its own accord, and the idea of " plant succession " has become a fundamental concept of Ecology.

Though we are far from knowing in detail the changes which have taken place in the vegetation of Scotland since the Ice Age, the investigation of the plant succession has given results of great interest, and has, moreover, thrown light upon the character of the vegetation itself. A review of these data forms an integral part of our subject. The story will be followed to the period at which Scotland assumed an aspect closely resembling that of the present day, and will, of course, involve a consideration of the changes introduced by Man. At first sight this may appear irrelevant; but a comprehensive survey seems necessary for the sake of completeness, to make clear the difficulty of speaking of a "primitive vegetation," and to facilitate the examination of a number of inferences concerning the natural vegetation which have been put forward by historians and students of place names and which are best reviewed in their proper setting. It might also be pleaded that the later stages of the evolution are of interest to the historical geographer. On these grounds, then, it seems justifiable to treat this aspect of the study in greater detail.

THE VEGETATION IN POST-GLACIAL TIMES:

I. From the Glacial Period to Neolithic Times

It has long been known that the peat deposits in many localities are not homogeneous from the base upwards, and that the type of plant remains which have been preserved often varies to a marked degree from layer to layer. Some thirty or forty years ago, attempts were made to reconstruct the history of the vegetation from an examination of these plant remains,[10] but since that time the story has had to be entirely rewritten, as more fruitful methods of approach have been found. Besides drawing inferences from the remains of the more resistant plant tissues forming the peat, it is now possible to calculate the relative frequency of the forest tree pollen which has survived in a fossilised form, and by this means the evolution of the vegetation in the vicinity of peat deposits can be traced in some detail. Correlation of results has allowed a tentative reconstruction of the succession of woodlands in post-glacial times, and the results of these investigations, in so far as Scotland is concerned, are briefly reviewed below.

The evolution of the present vegetation has been traced back to the closing stages of the Quaternary Ice Age. Whether it is true to say that all plant life was blotted out during the last great re-advance of the ice, or that some hardy species maintained themselves in certain possibly ice-free districts, has not yet been decided to everyone's satisfaction;[11] but in any case, such species as survived cannot have played an appreciable part in the evolution of the present vegetation. With the retreat of the ice sheets, there came a tundra-like vegetation on the lowlands, at a time when local glaciers probably still existed in the mountains. Varieties of

willow (*Salix*) and birch (*Betula*) seem to have been the first representatives of the forest trees to appear, and it is believed that soon after their immigration they became comparatively common in this country. Pine (*Pinus sylvestris*) entered shortly afterwards and spread far and wide. The pine and birchwoods thus formed are thought to have been of a comparatively open nature, and were soon invaded by the forerunners of the broad-leaved temperate forest ; first came hazel (*Corylus*), which rapidly attained a position of dominance in many districts, though birch and pinewoods continued to be an important feature of the vegetation. Then came the development, in districts providing a suitable habitat, of the mixed oakwoods, including oaks (*Quercus*), elm (*Ulmus*) and alder (*Alnus*), while the birch and pinewoods were much restricted. A little later, the forests of Scotland reached their maximum extent.

Retreat followed, with an accompanying period of rapid peat formation. Before the forests were at their maximum, the formation of peat due to climatic conditions does not seem to have taken place on a scale sufficiently large to lead to the development of extensive mosses, though humus had accumulated under the trees to form " forest peat." Now, however, came a rapid extension of the mosses, largely at the expense of the woodlands ; traces of these old forests have often been found. The accumulation of peat seems to have gone on until the present time, but there is some evidence to show that it has not been altogether continuous. Layers of tree stumps, usually of pine (*Pinus sylvestris*), are sometimes encountered, especially in the south of Scotland, showing that at one time the surface of the moss was sufficiently dry to allow of re-colonisation by trees. The pollen analyses, too, show that there was a secondary " pine maximum " long after the first (which came soon after the species immigrated). The stumps are of local distribution, and in some areas peat formation continued unchecked ; yet the occurrence is sufficiently widespread to be of interest, especially as other deposits, without the actual stumps, show signs of drier conditions at what is thought to be the same horizon. This period of relative dryness, if a single period it was, appears to have lasted but a short time, and the temporary pinewoods once more gave place to peat moss vegetation more or less as it is to-day, while the pines themselves (*Pinus sylvestris*) seem to have been restricted to the Grampians.

This succession as a whole is a very interesting phenomenon, and its explanation is not a simple matter. In the opinion of the writer, much has been made obscure and the issue over-simplified by a precipitate correlation with events in the Baltic region, where it has been proved to the satisfaction of most students that fluctuations in climate, for which de Geer has elaborated a method of dating the various phases in terms of years, have occurred in post-glacial times. The climate of the Baltic countries is not exactly similar to that of Scotland, and it is possible that the

changes there may have had different results and have been more important than here; again, de Geer's methods have scarcely been utilised other than locally in Scotland, and in any case correlation with results from the Baltic is a very difficult problem.

It is noticeable that the first trees to immigrate are species with wind-carried seeds, which might be expected to travel much more quickly than the heavy seeds of hazel and oak. A later dominance of hazelwoods and oakwoods over the earlier birch and pinewoods might be partially explained along these lines. Again, the soils on which the later woodlands grew were not formed all in a day from the "raw" clays and sands left after the final retreat of the ice sheets. The earlier dominance of pine and birchwoods may perhaps be partly related to the fact that these trees flourish on poorer soils than the oakwoods, and may have had a better chance of spreading under the soil conditions of the time. With regard to the later retreat of the woodlands after the period of colonisation, part of the explanation may again lie in soil evolution. The leaching of the sandy and gravelly soils and the formation of hard pan cannot have been sudden, so that a slow diminution of the woodlands might be looked for on these grounds.

Another factor may perhaps be found in the nature of peat formation: once a thin mantle has accumulated, the peat itself hinders drainage by acting as a sponge, while peaty acids which help the preservative process tend to form, and the colonisation of such wet peat by *Sphagnum*, which itself holds the water, becomes possible. Consequently, once a start has been made, the accumulation is up to a point an accelerating process. This factor, increasing in importance as time went on, tended first to stop further colonisation of the ground by trees and later to restrict the area already occupied. Even with regard to the occurrence of strata in which tree stumps have been found within the peat, explanations have been brought forward without invoking climatic changes. Woodhead has suggested that local changes in drainage may have led to temporary periods of dryness on the surface of the peat.[12]

It is not intended by any means to rule out climatic fluctuations since the close of the Ice Age in Scotland, but to point out that the succession must be studied as a complex phenomenon, independently of the periods observed in the Baltic region. The accompanying table has been constructed, from the material in an article by C. E. P. Brooks, to show the sequence of events as he conceives it, and the correlation with the periods established for the Baltic. The dating in years, it should be noted, is from this correlation with Scandinavia, not from Scottish data. With regard to the early periods, the dating must be considered with the greatest reserve, since there is no agreement as to when the ice left this country. De Geer himself has suggested that varve clays in the valley of the Earn near Dunning indicate that the lowlands were comparatively free from ice by about 13,000 B.C.[13]; but other

geologists maintain that the lowland ice-sheets continued in existence until the Finiglacial stage in Scandinavia (by de Geer's chronology, about 9000 B.C.), and that the glaciers in the mountains remained until an even later date.[14]

THE CORRELATION OF CLIMATE WITH VEGETATION

(Summarised from C. E. P. Brooks, *Jour. Roy. Met. Soc.*, 1934, pp. 384-90)

	Blytt-Sernander Periods (Scandinavia).	Climate in North-West Europe.	Vegetation in Scotland.
B.C. 10000			
9000		Ameliorating after Ice Age. Arctic and semi-Arctic.	Tundra.
8000	Pre-Boreal: Early	Very cold winters, cool summers, dry.	Birch dominant.
7000	Pre-Boreal: Late		(Pine spreading in Britain)
6000	Boreal	Cold winters, hot summers, dry, especially in summer.	Birch and pine dominant with hazel, and first appearance of mixed oakwoods.
5000			
4000	Atlantic	Mild rainy winters, hot and fairly moist summers, with frequent drought.	Birch and pine retreating. Mixed oakwoods very important. Rapid formation of peat.
3000			
2000	Sub-Boreal	Winters rather mild, summers hot, rainfall probably fluctuating.	Peat formation irregular; some bogs in south colonised by pine.
1000 B.C.			
A.D. 1000	Sub-Atlantic	Winters moderate, summers cool, wet.	Rapid peat formation and moorlands extending. Pine restricted to the Grampians.

If the climatic conditions indicated for the later periods did actually obtain, several difficulties are removed. The pollen analyses appear to indicate a relatively rapid development of the mixed oakwoods, and then a very rapid increase in peat formation during the early " Atlantic " ; with other factors at work, such as those already mentioned, a slight change in climate might be expected to produce quick results by disturbing what may have been a nice balance between soils, climate and vegetation. Similarly, the second maximum of pine pollen, the occurrence of tree stumps in the peat, and the indications of drier conditions at what is considered to be the same horizon in other peat deposits, are accounted for if there was a drier " Sub-Boreal " period long after the peat mosses came into existence. The importance of this phase must not be over-estimated, however ; there is no evidence of a great increase of pinewoods in the Western Isles, for instance, and it is very doubtful whether there was anything more than a slight drying out—insufficient to allow of colonisation by pines—on the mosses of central, western and northern Scotland. Some writers in the past have grossly exaggerated the importance of these temporary changes ; it has been suggested that " the forest growths ascended the mountains to an altitude of 3400 feet, or 1400 feet above their present range." [15] A general movement such as this is not indicated, as most of the major plant associations would not have their range materially affected, and only on the peat deposits would there be any considerable extension of the woodlands. Even then it was not universal.

II. From Neolithic Times Onward

So far as is known at present, the earliest human communities in Scotland had a culture of Mesolithic type and sometimes inhabited caves on what is generally alluded to as the " twenty-five feet raised beach." The evidence indicates that these caves were on the edge of the actual sea-beach at the time of occupation, when sea-level seems to have been higher in relation to the land than at present. Now the pollen analysis of peat deposits on this " twenty-five feet raised beach " shows them to be not earlier than the " Sub-Boreal " period, and presumably there was a marine transgression during " Atlantic " times. In the Carse of Stirling, for instance, deposits belonging to the alleged " Boreal " period are separated from Sub-Boreal and Sub-Atlantic peat, not by Atlantic peat, but by marine silts. There is no need or space to discuss these matters in detail, but the general conclusion is that this marine transgression coincided with the period of Mesolithic cultures. It is certain on other grounds that a number of communities with a culture older than the Neolithic lived in Scotland during " Atlantic " times ; but they were few and poor, they had no flocks and herds so far as we know, nor do they seem to have

been agriculturalists. Consequently, the vegetation of this country can have been but little affected by human agency before about 2000 B.C. That wild animals had some effect on the vegetation, especially in open woodlands, by grazing and destroying young shoots, is doubtless true, but their efforts cannot have been very important until they were reinforced by the introduction of herds of domestic animals in the Neolithic and Early Bronze Ages. Incidentally, the rabbit, which gives the forester so much trouble to-day, was apparently absent, and was not introduced, or at least did not become common, before about the twelfth century A.D.[16]

But in the Neolithic period and Early Bronze Age, the economic basis of life became broader, as agriculture and stock raising, rather than hunting and food collecting, became the main source of food supply. Invasions from the Continent and from South Britain also took place in the second millennium B.C., and it seems reasonable to suppose, from the comparatively large number of relics dating from the Bronze Age which have been found in this country, that the population was sufficiently large to be considered as a factor of importance in connection with the history of the vegetation. Any estimate of the actual number is impossible, though certainly it must have been much less than in the Early Mediaeval period ; even so, the influence of a population of just a few thousands with their flocks and herds, concentrated in the more favourable localities, could have a considerable local effect on the character of the vegetation. With this increase in population it may be said that there began in earnest the process which finally led to the destruction of most of the woodlands, and to a radical change in the nature of the vegetation generally.

This process of " developing " the natural vegetation must have gone on very slowly, even in Bronze Age times, since the population was still small and ill-equipped with cutting tools for clearing, felling and making burnt-over land fit for cultivation. But the effect in the long run of the grazing and the destruction of woodlands would be cumulative, and it seems reasonable to suppose that with the coming of more efficient tools during the Early Iron Age, and almost certainly with an increasing population, the restriction of the forest and the extension of the pastureland would be accelerated.

A map of native " forts," [17] most of which were in use during the centuries about the beginning of our era, shows that a considerable number of communities were scattered over the country, and would appear to indicate that the natural vegetation was being affected over wide areas. In this period, the settlement was not spread evenly over the whole of Scotland : the very rugged areas such as the Highlands, the peat mosses, the marshy lowlands and heavy clays with a covering of damp oakwood, were avoided. It was the better-drained land with lighter soils and with comparatively light woodland (such as dry oakwood), and oak-birch-

heath, which were colonised, together with the coastal districts, where tree growth was to some extent restricted by the wind, and the very sandy areas such as Tents Muir in Fife and Glenluce Sands in Galloway. The plant associations of such localities were undoubtedly the first to suffer change. Statements, however, that the pre-Mediaeval settlements were normally located in what was naturally forest-free land should be discounted. A study of the distribution of forts in various parts of Scotland, which it is hoped to publish shortly, has convinced the writer that the very areas which might conceivably be quite forest-free in early times were usually avoided by the settlers ; for instance, in the Lothians, only a small percentage of the sites occur above the upper limit of tree growth, and in Galloway and Caithness, the vast majority occur below 600 feet. Again, for this purpose the deep peat deposits appear to have been almost universally avoided.

Although forest clearance and the development of the natural vegetation was an age-old process by the end of the prehistoric period in Scotland, it would be unwise to hazard a guess as to what stage had been reached in any one period. In their distribution maps, the archaeologists often encounter blank stretches of lowland for which their explanation, *faute de mieux*, is that these were tracts of uninhabited forest. But " forest " is merely a supposition, for the absence of relics might be due to other causes, and even pure chance would play a large part if the country were not closely settled. In any case, the interpretation of archaeological maps of Scotland in this way presents considerable difficulty, for soils, topography, drainage and degree of exposure often vary greatly within small districts, and dense forests must have been scattered and restricted in extent, with nothing comparable to the wide stretches of the Wealden Forest or that of the Midlands of England. The archaeological sites themselves are frequently sporadic in distribution and limited in number, giving only a general idea of the inhabited areas of early times, so that it is quite impossible to judge how far the scattering is due to the presence of forest. The writer made the experiment of plotting all the known prehistoric sites over a considerable area in the south-east of Scotland on a map on the scale of 1 : 126,720 ; there was no practical result, as the distribution was often too even to be of significance. Although a sparse scattering was noticeable in some areas, such as the Merse of Berwick, parts of the Lothians and Strathmore, it was always possible to " infer " woodlands in these places without having recourse to the " no settlement " argument.

There are references to the appearance of Scotland in classical writings. Pliny (A.D. 23-79) had heard of the Caledonian Forest, and Ptolemy (mid second century A.D.) seems to have placed it in what is now approximately Perthshire, though the reference is vague. In Xiphiline's abridgement of the history of Dio Cassius (A.D. 150-235) there is mention of the forests of Scotland, and

Tacitus (A.D. 55-120), too, implies that woodlands were common. These statements have been taken at their face value by generations of historians, who, in discussing the Roman invasions, have not hesitated to clothe Scotland to the peaks of the higher mountains with a dense impenetrable forest ; curiously enough, these very writers make Agricola manœuvre his troops at the battle of Mons Grampius " in Strathmore " with as much ease as though he were on a parade ground.

The allusions of these classical writers are of very doubtful value, and have often been misinterpreted. Most of the information, such as it was, appears to have been derived from hearsay. Dio was concerned with eulogising the Emperor Severus, and the destruction of trees over wide areas is surely to be considered in this case as pardonable exaggeration. Tacitus, in making the enemy fly to the woods after defeats by the Romans, was disposing of them in a way suited to his narrative and literary style, without paying careful attention to the true nature of the landscape. That the Caledonian Forest is placed approximately in Perthshire is possibly due to the fact that this was one of the few areas north of the Antonine Wall with which the Romans were tolerably familiar. This " Caledonian Forest " is best considered as a myth which has served its purpose well ; descriptions of its boundaries which are sometimes to be found in local histories and the older text-books must be treated as fiction.

Local historians often give descriptions of " former forests," but the evidence—when any is given—is rarely reliable. Much confusion has arisen over the misinterpretation of the word *foresta*, which refers, not to woodland, but to waste or hunting ground, in much the same sense that " deer forest " is used at the present time. Again, the writings of classical authors, or " old tree stumps buried in the peat "—probably of Boreal or Sub-Boreal date—are often cited as evidence of woodlands in existence in Roman times. It is necessary to treat these descriptions with the greatest reserve.*

Place names, too, sometimes yield fragmentary evidence of a somewhat similar nature. Many difficulties are to be encountered, however, not only in the etymology of the names themselves, but also because a descriptive name, perhaps suggesting the presence of trees, may have been given to a particular locality by reason of the exceptional nature of the place ; for example, a small area surrounded by a few trees in the midst of an open moor might be

* A particularly difficult position exists with regard to a forest in the Flanders Moss area above Stirling. Much was and still is covered with peat, and on *a priori* grounds we should expect the tree stumps continually found there to date to the Boreal or Sub-Boreal times. But references occur repeatedly to what are alleged to be axe-marks on the stumps, about three feet above root level, and many writers contend that Severus was responsible for the destruction of this forest. One explanation put forward is that the forest is of Boreal or Sub-Boreal date, and that as the trees were gradually enveloped in peat, the stumps were preserved to the same three-feet level, and that the " axe-marks " are merely the break when the dead trees finally fell.

given a name relating to the trees as the distinguishing feature, not to the moorland. In any case, there is no adequate survey of Scottish place names such as is being compiled for the counties of England, and until such a catalogue is made investigation will be at the very least extremely difficult.

With the evidence to be obtained from documents such as abbey records and old charters we are on safer ground. Many woodlands, which have now disappeared, survived until well on in the historic period, and their existence is well attested in these old records. But unfortunately it is rarely possible to estimate the exact areas and nature of these forests ; references to woodlands lying to the west of Edinburgh, or on the slopes of the Pentlands, or on the northern slopes of the Ochils in the wood of Drumselch, are interesting, but are useful only in confirming impressions from other sources. At least within the writer's experience, the references seem far too fragmentary to allow anything in the nature of a map of the woodlands in Mediaeval times to be constructed.

By the end of the fifteenth century, forest clearance had gone so far that attempts were being made to preserve the existing timber resources, and in the succeeding centuries there are references by contemporary writers to the treeless nature of Scotland. Nevertheless, these must apply to the southern part of the country, for in the eighteenth century there was an iron industry in the glens of the Western Highlands, whither iron masters had migrated from various parts of Britain in search of fuel. An incomplete map of the " Bloomeries " exists,[18] and shows that some of the glens of Argyll, parts of Perthshire and the northern Grampians, and some of the glens in the North-West Highlands, must still have had a considerable amount of woodland, though at the present time many of these areas are comparatively poor in trees. Apparently, therefore, it was not until the eve of the Industrial Revolution that Scotland finally assumed the treeless aspect which characterises much of the country now, though the process was completed earlier in the Central Lowlands.

The great age of forest clearance in many parts of central and north-western Europe is generally said to have been the Mediaeval period. In England, a very important step forward in the occupation of the areas of deeper and heavier soils was made in the period immediately after the Anglo-Saxon invasions ; the new-comers were able to clear and deal successfully with those areas which had hitherto been avoided. In Scotland, however, the Angles colonised a restricted area (in the south-east), and the occupation of the heavier soils probably proceeded more gradually. Another factor is that cereal cultivation is not so attractive in many parts of Scotland as in South Britain, nor was there the same demand for " water meadow " ; grazing was often an easier method of land utilisation, so that there was less incentive to clear and drain heavy soils. Again, continuous areas of heavy soil are not so

extensive on the lowland as in South Britain, and the dense forest was probably attacked piecemeal.

On the whole, considering the widespread nature of the settlement even in the Early Iron Age, and the absence of evidence to the contrary, it would seem advisable to look upon this process of forest clearance as taking place over a very long period, without any marked acceleration during the early Mediaeval period, and ending only in the eighteenth century. This is a tentative suggestion, and a sifting of all the available evidence relating to the distribution of woodlands in the Middle Ages more careful than has been undertaken by the writer might lead to a rather different conclusion. The history of the vegetation did not, of course, cease with the transformation of the old woodlands, but the later stages fall rather within the province of the economic geographer, and have been reviewed in some detail in a recent publication.[19]

On Maps

By way of conclusion, a word must be said with regard to maps. Their exclusion from this paper is intentional and upon principle. Our knowledge is deficient in general and in particular on a number of crucial points ; maps of the soils and vegetation at the present day are incomplete to say the least, and even detailed geographical regional surveys are very few. From period to period, the vegetation has changed ever since the Ice Age, and not one but several maps are necessary to give even a synoptic view of this transition. Attempts which have been made to show the distribution of the primitive forest of England, after very careful study, have been severely criticised, and there is no point in repeating that experience with a more difficult terrain. No one can gain greater satisfaction than the geographer from the contemplation of a good map ; and no one can appreciate better the absurdity of attempting to construct, from the intangible data at our disposal, a reliable or even useful map of the " primitive vegetation."

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CONTRASTING TYPES OF SETTLEMENT ON THE JAMES BAY PLAIN

By John Q. Adams, Ph.D., University of Missouri

Contrasting types of human occupance occur close together in the James Bay area of north central Canada. One of these, the European type of interlocking agriculture and industry, spread north and west from the St. Lawrence Valley and Ontario Peninsula; an offshoot of the rail net in this highly-developed, westernised area extends north to tidewater at Moosonee on the lower Moose River near James Bay (Fig. 1). The second type is the fur trade. A focal point for this activity is Moose Factory, located on an island in the Moose River opposite Moosonee. Moose Factory, second oldest post of the Hudson's Bay Company, was established on a nearby site in 1671 and has occupied its present site since 1730.[1]

These two settlements, only four miles apart on the ground, are far apart in origin, function and future. The port of Moosonee was founded less than ten years ago (1932) [2] as an outlet for existing and potential areas of white settlement to the south and west. Its future depends chiefly on the further development of the European way of life in its immediate hinterland. Moose Factory, in contrast, was established over two hundred and sixty years ago (1671); and was created as an inlet for fur traders who came by sea from London and sought to reach the Indians in the James Bay drainage basin. The continued prosperity of Moose Factory depends on the absence rather than the presence of white settlement in the Moose River basin, because such development probably would displace the fur supply on which the post depends.

This paper presents a brief outline of the origin, functions, resultant landscape forms, and probable future of Moosonee and Moose Factory. The Factory is discussed first, as being the older and more completely stabilised in its functional complex.

Moose Factory

The old settlement now functions only as a post for the fur trade. It serves the lower Moose River Basin and the nearby

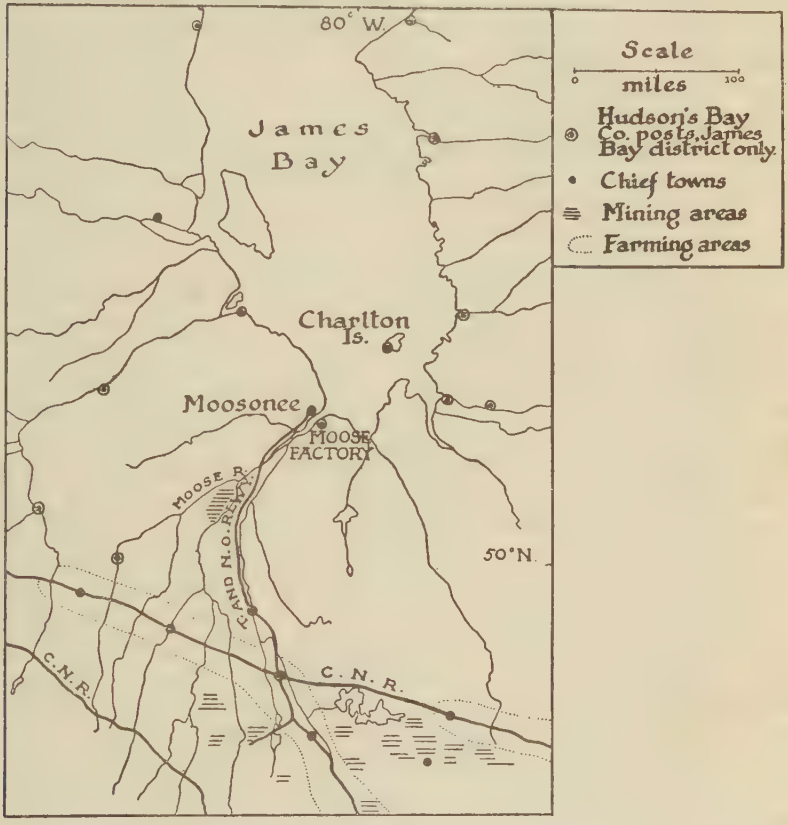

Fig. 1. The James Bay District. The farming area along the railway in the upper Moose River drainage basin is a part of the great Clay Belt zone of pioneer agricultural settlement.

coast of James Bay. The Factory has lost its former status as a manufacturing and wholesale distributing centre for all the Hudson's Bay Company's posts in the James Bay area, and the fur trade, which is the justification for its continued existence, depends upon the flow of trade downstream from the Moose River drainage basin (Fig. 1). The additional earlier functions—wholesale distribution and manufacturing—grew out of the post's excellent

situation at the head of the symmetrically shaped bay. From this position both imported articles and locally made goods could be redistributed quickly and easily to posts on each side of James Bay.[3]

In the days of small ships and hand-wrought goods, space was saved on the ships by bringing in raw materials such as iron plates, rods and wire, and using Indian labour to convert them into pots, traps, fish hooks and similar articles of local use. Hence the name "Factory."[4] These goods were distributed throughout the James Bay area along with other commodities which were imported in finished form. During the latter half of the nineteenth century cheap machine-made products from the industrial districts of Canada, Great Britain and the United States displaced most of Moose Factory's hand-made goods, and the importation of such bulkier prefabricated articles made larger ships necessary. Eventually the Company sent out ships with too great a draft to navigate safely in the seven-to-ten-foot minimum channel of the lower Moose River.[5] Consequently, in 1904, Charlton Island in James Bay succeeded Moose Factory as the central depot and distributing centre for the James Bay district.[6]

The cultural landscape forms at Moose Factory show these obsolete functions as well as the persisting and new functions. Inactive or non-functioning landscape forms are the old factory building and warehouse; the office space and living quarters formerly used by the large staff of white traders, foremen and supervisors; and the large hay fields which provided feed for the horses which were used to move bales of fur and other heavy goods (Plates 1 and 2). Active or used cultural forms produced by the continuing (fur trade) functions are the trade post section of the old factory building, the post manager's house, and the houses and tents used as summer homes by the Indians (Plates 1, 2 and 3).

Additional active forms at Moose Factory are due to certain agglomerative functions. These activities, which have been attracted by the flow of people (chiefly Indians) and goods to the established trade centre, are spiritual and governmental. Landscape forms created by such functions are the Anglican Church and Mission School, the Roman Catholic Church, the combined station and residence of the Royal Canadian Mounted Police, and the home of the local physician, an employee of the Dominion Government (Plates 1 and 4). These cultural forms are in continuous use because they serve certain human needs which persist regardless of fluctuations in manufacturing methods, the size of ships, or the supply of fur.

Moosonee

Moosonee, like Moose Factory, is located at the farthest point downstream where the river bank is high enough to give com-

[*Courtesy of "Associated Screen News Ltd.," Montreal.*

PLATE 1. The western part of Moose Factory settlement. Hudson's Bay Company buildings and hayfields in foreground, police post, Anglican church and mission school in background. The eastern part of the settlement, out of sight at the right, consists of a few dozen houses used by the Indians in summer (Plate 3) and a small repair yard for trade boats. Moosonee is on the opposite side of the western channel which can be seen in the distance.

parative safety from spring ice jams and floods (Plate 5). Also, as there is a five-to-seven-foot tide in the river at this point, Moosonee technically can be considered a tidewater port.[7] The shallowness of the channel, however, which has only twelve feet of water at high tide, prevents large sea-going vessels from reaching either Moosonee or Moose Factory. Consequently Moosonee has very little sea-borne commerce, and what it has is carried in small boats of less than sixty registered tons.[8]

Moosonee was established largely as a result of the desire of the British people of Ontario for a seaport which would aid in the colonisation and development of northern Ontario and be independent of the old-established St. Lawrence ports in the province of Quebec.[9] Consequently, the provincially owned Temiskaming and Northern Ontario Railway was extended northward beyond its original objectives—the northern mining and agricultural areas—until tidewater was reached at Moosonee (Fig. 1).

The actual city of Moosonee consists now of such new cultural forms as two small trading posts, one established since the completion of the railway, a Hudson's Bay Company warehouse, the railway station, a small well-equipped tourist hotel owned by the railway, the railway line, a few residences and two small wooden landing stages in the river (Plates 5 and 6). These cultural forms depend upon the railway or the fur trade for their existence. The Hudson's Bay Company warehouse was established in 1932 in order to handle trade goods shipped in over the new railway and has replaced the Charlton Island depot as the Company's distributing and collecting centre for the James Bay district.[10] Thus a newer and still more reliable means of transport, the railway, caused a second relocation of the James Bay depot of the old trading company. Even large steamships equipped for ice-breaking are occasionally delayed by ice floes in James Bay during the short late season for which it is open, but the railway operates regularly winter and summer. It is important to note, however, that in spite of changes in means of transport the distributing centre for the James Bay district has remained somewhere near the mouth of the Moose River, thus attesting the fundamental advantages of the locality as the site of an *entrepôt* for the bay.

The Outlook

In spite of its excellent location for trade with the James Bay settlements, Moosonee probably never will become a great or perhaps even a well-developed seaport. Settlement of the hinterland is slow and irregular (Plates 1 and 7), and most of the export goods produced, such as minerals, wood pulp and dairy products, probably will continue to be sent southward by rail to the urban centres in south-eastern Canada and the north-eastern United States. Moosonee can develop only a small amount of trade with

the other James Bay settlements because all of them are small and depend almost entirely upon the fur trade. Also, if a usable ocean port ever is needed near the head of James Bay, it is not improbable that the Moosonee site may be abandoned for some location on the actual shore of the bay where the expense of dredging and ice-breaking might be less. Although no site of this superior type is known, rumours concerning the removal of the port to a new locality are already afloat at Moosonee, encouraged doubtless by the recent abandonment of Port Nelson for Port Churchill on the western side of Hudson Bay.

The province of Ontario will not abandon its northern port, terminus of its own railway, unless forced to do so as a measure of extreme economy. Changes in political policies may continue to bring shifts in personnel and in train schedules, but the railway will be kept open and ready to serve the port. Moosonee may be moved, but the rail line to the Bay will not be abandoned. Probably Moosonee will continue on its present site as a local distributing centre with a small amount of tourist trade.

Moose Factory likewise has an uncertain future. In all likelihood it will continue on its present reduced scale as a trading post serving a restricted territory and keeping its agglomerative functions intact. However, if the invasion of independent traders via the railway and Moosonee continues, the old post may be forced out of existence, in which case the Indians who now go to Moose Factory might be diverted to Moosonee as the nearest place of assembly during the summer. Undoubtedly the agglomerative activities now at Moose Factory would follow the Indians to the new location. Any considerable growth on the part of Moosonee or its successor on a nearby site probably would cause a similar shift of most of the Indians and agglomerative activities even if Moose Factory were not abandoned.

Conclusions

The settlements on the lower Moose River are far apart in age, origin and aim, yet they have one common function, the fur trade. Completion of the railway has affected the fur trade in several ways : supplies for the traders now come from the south by rail and are distributed from Moosonee instead of coming from the north by sea and being distributed from Charlton Island ; also the availability of cheap rail transport has broken the near monopoly of the larger fur trading companies, because it permits supplies to be brought in and furs to be taken out without the necessity of owning a large seaworthy boat capable of operating on James Bay and Hudson Bay.

The advent of the independent trader has to some extent been deleterious to Moose Factory, but the rise of Moosonee as a wholesale centre for the fur trade has had little effect on the old post ;

PLATE 2. Factory building at Moose Factory. The rooms behind the wooden awning are now used for the local fur trade. The small building beyond the factory contained the old regional headquarters office.

PLATE 3. Houses used by the Indians during their summer residence at Moose Factory. These houses are built by the Hudson's Bay Company and furnished rent free as an inducement to trade at the post. The Indian girls in the foreground are dressed in their best clothes and are on their way to church.

PLATE 4. Post of the Royal Canadian Mounted Police at Moose Factory. Vegetable garden in foreground: Anglican church in background.

PLATE 5. Trade post (centre) and residences at Moosonee. Note the height of the bank at low tide.

PLATE 6. New warehouse of the Hudson's Bay Company at Moosonee. The wooden landing stage shown is the only freight wharf at Moosonee.

PLATE 7. Typical home and garden of a pioneer farmer in the lower Moose River basin. The timber cover is neither so thick nor so tall in many of the interstream areas and numerous swamps.

its wholesale function had been lost to Charlton Island by 1904. Moosonee has not become a great or even a well-equipped port. However, until the James Bay drainage basin is more completely settled and exploited there is no cause for building better port facilities at Moosonee or any alternative site. Both settlements are in transition, Moose Factory slowly declining and Moosonee apparently rising, but either may stagnate or disappear according to the adjustment of forces now operative. During the next few years both settlements probably will continue much as they are now. Moose Factory attained stability long ago; Moosonee is decidedly unstable and will so continue until it is either abandoned or more completely developed both as a harbour and as a port. Neither change is at present impending.

Whatever the future of these two settlements, they present an interesting picture of the readjustments which take place when the modern economic frontier with its problems, cares and opportunities, suddenly advances along a new railway into the comparatively backward yet established domain of the Indian trapper and white fur trader.

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HUMAN GEOGRAPHY, HISTORY AND SOCIOLOGY

By Professor C. Daryll Forde

I

In two recent papers Mr. Crowe and Dr. Dickinson have raised anew the question of the scope of Geography as a field of study.[1] Mr. Crowe has criticised the basis on which assertions of its independence have rested in the past and has proposed objectives which Geography should claim and pursue, while Dr. Dickinson has re-formulated the doctrine of the study of the natural and cultural landscapes. Despite mutual criticism their views have much in common, and it is to the relation of their conclusions to the general field of knowledge, and to the formulation of valid problems and objectives in research, that I wish to direct attention.

Both writers are apparently agreed that the field generally known as Human Geography is the central objective, and that studies in geomorphology, climatology and cartography are separate and at most ancillary fields of investigation. Thus Crowe states, " We have declared finally and irrevocably for Mankind as the central figure of study " (p. 3), while Dickinson asserts that " the fundamental approach . . . to the geographical study of area is the evolutionary description and interpretation of landscape, viewed as the expression of man's activity in relation to it " (p. 7). These statements undoubtedly imply that the central objective of Geography is the description and analysis of certain aspects of human activity, and the question immediately arises as to the sense in which there is such a field of social activity which may be either logically or empirically distinguished from other studies of society. Both Crowe and Dickinson attempt to define and justify such a field, but their efforts do not go to the root of the matter, and the reasons for their inadequacy can be shown to lie in the fact that their initial assumptions inevitably involve the placing of Geography within the wider fields of History and Sociology.

Crowe shows with admirable lucidity that a definition of Geography as " the science of distributions " is either an empty phrase or a " pernicious half truth," and emphasises the point that " It is really preposterous to try and divorce time from space in the theatre of human affairs." He suggests that separation may be excused on grounds of pedagogic convenience ; but the rational and convenient division for teaching purposes is into internally coherent sections of space-time. Purely chronological divisions on the one hand, and purely spatial, achronic divisions on the other, are not convenient or even possible in human affairs, whether the end in view is explanatory or merely descriptive.

This is obvious in formal teaching both in " History," where the " period " must always apply to an " area " (or territory), and also in " Geography," where the economic or human geography of a *region* actually relates to a particular *period*, usually the most recent historical phase. There has long been a tendency among students of Human Geography to use the term " region " for the most vaguely defined areas, and, having applied it, to assume that the area in question has thereby been endowed in a peculiarly geographical sense with particular qualities of functional unity that are not in fact adequately demonstrated or analysed. Crowe shows that to regard a " region " as an organism is a mystical notion, and that the assumption of the existence of " regions " in nature affords no technique for their definition and analysis. " Nature," he reminds us, " has no inherent functions with respect to man ; function can only mean the use to which it is being put. . . . The regional principle . . . must be supplied by man, . . . regional geography becomes in essence a human study." He also points out that " Distributions are always changing with the

varied interplay of forces. . . . To understand these forces we must dig deeply with analytical tools" (pp. 13, 11, 6). But the forces referred to are social processes, so that the explanation of changing distributions must be part of the explanation of changes in social conditions. The marks of human activity on the surface of the earth are the products of social processes; they can only be accounted for in terms of social structure, technological equipment and cultural values, and the essential problem becomes that of the character and effects of the social organisation. In other words, generalisation accounting for the facts of human distributions must be derived from the study not merely of the distributions themselves but ultimately of the cultural conditions which produce them. Thus are we led straight into the heart of the cultural field.

Dickinson's thesis leads to a similar conclusion. In asserting that "the region is to be examined as to the origins, functions and grouping of its landscape elements," and that "this attitude demands therefore the study of how the cultural landscape has evolved from the original and natural landscape," he admits the necessity for full consideration of cultural, including economic, and other conditions which is expressed more precisely by Krebs's statement that

> ". . . to understand the landscape and the areal relationships of its elements, it is essential to examine the social structure and peculiarities of the society which created and lives in it."

Let us consider for a moment what this implies in terms of elements from a landscape selected at random. The chalk uplands of southern England have as prominent elements of the cultural landscape not merely those associated with the present agricultural economy but also such elements as round barrows, long barrows and hill forts at one end of the cultural time scale and aerodromes and arterial roads at the other. In the first place, therefore, a full understanding of the cultural landscape of Wessex involves an understanding of the "social structures" or "organisations" that produced so vast a range of disparate features. Further, no amount of consideration of these phenomena merely as features in this landscape alone will achieve such understanding. This can be reached only by an intensive investigation of the separate classes of landscape features and of all other data relevant to them. Thus, for example, the comparative study of the modes of construction and contents of round barrows in Britain, and of related constructions on the Continent, have established the existence of multiple invasions and subsequent expansions of related social groups of barrow builders (the Beaker Folk) from the Lower Rhineland early in the second millennium B.C., and a subsequent phase of cultural hybridisation between the invaders and pre-existing communities.[2] Round barrows superficially similar may in fact have been constructed by different groups at widely separate points

in time. The only sense in which one can be said to " understand " the round barrows of the Wessex landscape is to relate them to these events in Britain and western Europe in the second millennium B.C. It can rightly be claimed that study of the distribution of round barrows in Wessex and its relation to other physical and cultural distributions in that area is likely to yield significant results in this connection. But this is in fact no justification for a geographical study divorced from the general study of that particular phase of prehistory.

In the course of archaeological research a great deal of attention has in fact been paid to the " distribution in area " of the cultural features involved. Of this the mapping and analysis of the distributions of beaker types referred to affords an example. In this way the preponderant distribution of beakers on areas of porous subsoil in East Anglia acquires significance as part of the explanation of the points of entry and lines of movement of different groups of Beaker people and of the physical conditions under which this occurred. The case with regard to the Hill Forts of Wessex is precisely similar. The detailed archaeological investigation and cultural analysis of the relevant Early Iron Age cultures, in which great progress has been made in recent years, is proceeding *pari passu* with analysis and inference concerning the significance of distributions. Investigations of cultural distributions can be profitably undertaken only as part of the analysis by which the significance of particular cultural elements is established. It could not, in the example given above, proceed simply on the basis of barrows as features of the landscape. It is, in fact, not the separate task of a " pure " geographer, but a " geographical " aspect which is part and parcel of the " archaeological " enquiry. Even so traditionally " geographical " a topic as the relation of barrow distribution to physical features lacks significance apart from the general problem. The implications, indeed, of the fact that the majority of barrows are on high ground remains obscure, since there are insufficient data to generalise as to the relation of barrows to settlement.

This must not be taken to imply that distributional studies and enquiry into the relations between cultural distributions and physical conditions are unimportant ; in the archaeological field they are yielding most valuable results, but these are inferences concerning the character, development and adaptations of particular cultures which must be studied as such. Similarly in the investigation of primitive cultures, distributional studies have been used extensively to elucidate problems of diffusion and culture change, and the results of the *Kulturkreis* school, whatever their validity, must be recognised as being based almost entirely on inferences from concomitant distributions.[3] On the other hand, the study of social institutions among primitive communities is recognised as involving a complete analysis of the relation of social

life to physical conditions, such as that undertaken in Steward's recent and most effective investigation of " Basin-Plateau Aboriginal Socio-political Groups." [4] What is implied, however, is that Geography, if its definition as the study of " the works of man in area " is to have meaning, is but one weapon in the armoury of the student of society and a weapon which cannot effectively be employed in isolation.

It may be felt that in selecting as illustrations landscape features dating from remote antiquity I have introduced irrelevant considerations, since the techniques necessary to archaeological enquiry are exceptional and specialised ; but in fact the essential unity of cultural problems, and the futility of attempting to carve them up into purely " areal " geography and a purely chronological history, are thrown into prominence in this field. Moreover, it can readily be shown that the understanding of the recent features of a landscape is equally dependent on the elucidation of cultural phenomena which are not represented in the landscape itself. Thus, for instance, the development in the nineteenth century and the recent decay of great iron and steel works in Merthyr Tydfil, as contrasted with the continued development of the more recently constructed plant at the port of Cardiff are to be understood only in relation to technological and economic history in Britain during the last hundred years. Explanation of the fact that the restoration of the iron and steel industry of Ebbw Vale should recently have been carried out, while that of Merthyr Tydfil remains derelict, although the two districts are homologous in *local* physical and social conditions, is to be sought in the differing financial condition of the industrial organisations concerned. The distinction between prehistoric and present-day problems lies only in the degree of general familiarity with the cultural conditions and historical processes involved, a familiarity which is not, be it said, generally sufficient in the case of contemporary studies to permit of explanations of distributions without special historical or " sociological " research.

Furthermore, the elements of the cultural landscape in a long-settled area are of greatly varying age and are culturally miscellaneous. Some, like the prehistoric sites referred to earlier, or ruined abbeys and abandoned mine workings, do not function in their original sense in the existing society. To attempt within the compass of one investigation " full understanding of the present landscape elements " would be impracticable for many areas, simply because the variety and complexity of the successive cultures that have contributed elements are too great to be encompassed in the detail necessary for effective research. It would be wasteful and inefficient for the student of each " landscape " or area to try to be a jack of all periods, for it would involve investigation and reconstruction of the social conditions of all the successive culture phases from, say, 3000 B.C. to the present day. Consideration of

the cultural landscape must, therefore, if original and fundamental work is to be done, be confined to a limited set of features in the selected area ; and these features must inevitably be selected for their relevance to a particular culture phase.

But for this selection and for assessing the cultural significance of elements there must be the fullest understanding of the character and development of that phase. In other words, the investigation of the cultural landscape is integral to the study of the cultural whole to which it belongs. This Dickinson recognises when he says : " We must know how the elements hang together in area on the basis of human relationships, irrespective of the tangible expression of those relations " (p. 6). Such " hanging together " is, however, the central problem of any culture or social organisation. There cannot, therefore, as a principle of method in investigation, be " primary emphasis on areal relationships." There can only be the application of the result of a comprehensive cultural study to the elucidation of particular space relations. This is applicable also to a similar statement by Crowe in which, after recognising that : " Only by a dynamical study of man's geographical reactions shall we approach the truth. . . . In some aspects, it is freely admitted, this will bring geographical work into close contact with the field of sociology," he adds, " but emphasis will always be on the space dimension rather than upon systems of human relationships." If, as he says, " regional organisations must result from a system of human circulations," we are inevitably concerned with " systems of human relationships," which are, to use his own term, the " dynamical " factors. Such systems have of necessity both a space and a time dimension, and arbitrarily to emphasise one at the expense of the other is to obscure the " truth " which is sought. Crowe has himself reminded us that " regional geography becomes in essence a human study. It is one thing to pay lip service to this view, and another to carry it to a logical conclusion " (pp. 18, 11).

Fundamental difficulties arise from the assumption that the aggregate of the elements of landscape constitutes a coherent and self-contained field of study. Landscape features comprise both physical and cultural phenomena, and these two classes are not capable of explanation in the same terms, or within the same system. Moreover, neither is capable of explanation solely in terms of phenomena directly observable in the landscape.

The physical conditions observable in landscape are capable of explanation as special cases of physical laws, while their particular relations in a given landscape may be made intelligible in terms of a reconstruction of the relevant physical history of that portion of the earth's crust. It is not, however, possible to deduce from generalisations concerning the physical features of landscape the particular relations of its cultural features either among themselves or to the physical features. The position may become clearer if the parallel situation in the biological field is considered. The

relations of living organisms to the physical conditions of the external environment can be established only on the basis of investigations of the structure and physiology of the organism. Plant and animal ecology must be and is based on the analysis of biological processes. It cannot be derived deductively from laws relevant to the external environment. Similarly the adaptation of human activity to physical conditions can be understood only in terms of social processes as revealed in the organisation and past history of the communities concerned.

The explanation of the features of a cultural landscape is but part of the explanation of the culture of which those features are manifestations. The cultural features of a landscape are, on the other hand, part of the data for the elucidation of the social conditions of the communities occupying an area, and ultimately for the formulation of sociological principles.

The controversy concerning what has been called " geographical determinism," and the refuge which geographers have taken in somewhat uncouthly labelled " possibilism," also derive from misconception of the relations between physical conditions and cultures. There is a sense in which determinism may legitimately be invoked, but it is the reverse of the older sense. It is not that physical conditions determine the forms and objectives of human activities, but that at any given stage in the process of interaction the established social organisations and cultural objectives determine the relative value and specific effects of the various conditions of the physical environment. Within social structures, there are continuous and complex interactions, including reactions to the conditions of the physical environment ; but physical conditions can never be held to determine a particular social adaptation. On the other hand, an adaptation once established does by cultural inertia determine for a period the significance, and hence the influence, of particular physical conditions.

II

The logical difficulties referred to above are perhaps due to misconceptions concerning the " social sphere " and the implications of historical study. It is accordingly necessary to obtain a clear understanding of the nature of historical enquiry and knowledge. Although the term " History " is often used loosely and with varying connotations, its central and constant nexus of meaning relates to events, a point which is emphasised by the etymology of its Germanic equivalent *Geschichte*. As a field of knowledge History is concerned with particular events and with their relations to one another ; but these are not restricted to relations of chronological succession. Nor does History exclude the study of the relation of events continuing into the present. Bernheim says of Human History that

" it investigates and presents, in their context of psycho-

> physical causality, the facts, determined in space and time, of the evolution of men in their individual as well as typical and collective activity as human beings."

Pirenne succinctly concurs that " The object of the study of history is the development of human societies in space and in time." [5] Events which the human mind may observe or reconstruct are not of course confined to the activities of man ; nor is historical knowledge so confined. Both geology and astronomy, as distinct from astro-physics, are historical studies of physical events. For their reconstructions they use techniques which are popularly called " scientific " because they involve inference from natural objects and not from written documents.

There is, however, although it is not observed in the Faculties of our Universities, a valid distinction between History and Science which applies theoretically to the study of all phenomena, physical, organic, psychological, and social. The essential characteristic of the historical approach is the endeavour to achieve a conceptual integration of individual phenomena (" facts " or " events ") in terms of specified time and space. Science, on the other hand, is not directed towards the description of particular events. Its objective is the formulation of constant, timeless and placeless relations between properties abstracted from objects or events. These constant relations of abstract properties, known as laws or functions, and their integration in an ever widening scheme of logically necessary relationships, are tested empirically against reality, *i.e.* particular relevant events. If valid, they may serve to account for those events ; but they are not descriptions of them or of the particular relations they exhibit in the historical sense.[6]

An illustration from a group of natural landscape phenomena may make this fundamental distinction clear. The designation of a tract of limestone country as being in a condition of mature dissection, and the description of the past development and present forms of its features such as lapies, dolines, and poljes, constitute essentially an historical account of a sequence of interrelated events continuing down to the present. Scientifically the significance of these karst phenomena is quite different. They are special cases of such chemical laws as those of solution and such physical laws as those of motion and may be expressed in the special geomorphological laws which proceed from these. The scientific significance of the phenomena lies in establishing or illustrating the relevant laws and their interrelations.

The terms " history " and " science " thus express two conceptually distinct approaches to knowledge. The essential difference between them lies not in subject matter but in their objectives. Their differing value and applicability in various fields depends largely on the complexity of the phenomena perceived and on the practical possibility of isolating direct and recurrent relations for

repeated observation. Physical and organic phenomena are with increasing success being accounted for in terms of scientific laws, but in the cultural sphere attempts at explanation remain largely in terms of particular historical sequences. The categories of the social historian (of which those connoted by such terms as feudalism, urbanisation, the Renaissance, the Industrial Revolution, or the Plantation System may be cited at random) refer not to universals, to laws of relation between abstract qualities of phenomena. They are empirical generalisations concerning aggregates of particular human activities, comprehended as wider entities on the basis of interrelations between the particular cultural phenomena within the framework of a specified space and time.

The historian has, however, to use inference in order to reconstruct " what really happened," *i.e.* the course of postulated events, from the incomplete and indirect evidence of his sources. It is sometimes suggested that such inference is in fact based on sociological principles and the historian is therefore working scientifically. This is true in so far as historians, including students of contemporary societies, formulate or invoke such principles ; but it must be realised that inferences from evidence to event are as a principle of method deliberately restricted in range, and are confined to estimates of probability on the basis of credible evidence. Abstract universal relations or laws which are the goal of science are not sought. The constitutional historian establishes and explains a political development not in terms of laws of human mentality or social evolution, but on the basis of documentary evidence of particular actions and on the probability that certain persons and groups had intentions and powers which were substantially responsible for these actions. The assumptions concerning human behaviour are of an empirical character. Similarly the student of the economic geography of, say, the London area to-day is concerned in the first place with the evidence for the occurrence of particular economic activities in certain places and circumstances. He then generalises concerning the character and causation of these phenomena on the basis of the particular relations which he infers. But he does not claim for his explanatory description that it has universal validity and is equally applicable to, say, Clydeside or the lower Yangtze area.

The organised attempt to formulate scientific laws concerning the forms and relations of processes in human society is generally recognised as the province of Sociology, and there is now general agreement as to the distinction between the aims of Human History and of Sociology. The term Sociology is sometimes applied to descriptive studies of contemporary social organisations and activities, including economic organisation, but such studies are essentially historical, and this use of the term is not consistent with the objectives of Comte, Spencer, and other early sociologists, nor of contemporary writers on sociological theory.[7] There is an

essential difference in the scope and objective of the inferences whereby the historian establishes events and their particular relations on the one hand, and those whereby the sociologist on the other attempts to establish the validity of abstract universal laws of social form by inference from " events " reconstructed by the historian.

While Historical and Sociological objectives differ in essential character this does not imply that an investigator can or should attempt to frame hypotheses of the one type without reference to relevant hypotheses of the other order. Historical study is essential to test the validity of sociological hypotheses. The distribution and sequence of particular occurrences must be considered when postulating a general law.

The historical problem is the discovery and definition of the phenomena which co-exist or follow in sequence. What is generally meant by the assertion of an historical relationship (as distinct from a juxtaposition) is the claim for the existence of particular relations between those phenomena. The explanation of the Industrial Revolution in Britain in the eighteenth and nineteenth centuries, for example, consists in tracing specific connections (or empirically determined causal relations) between the items of a complex series of particular events. Sociology is not concerned with particular historical facts except in so far as they provide the inductive basis for postulating universal relations between abstract properties of social phenomena, *i.e.* for establishing fundamental laws of social relations. Quite apart from the issue as to whether sociological laws so far formulated are but truisms or empirical generalisations, the objective must be recognised as scientific in that it is the isolation of abstract universals from particular historical contexts, and the demonstration of necessary relations between them.

Human History as a field of academic study has until recently suffered from the establishment of over-rigid conventional divisions, both territorial and cultural. Divisions are inevitable on account of the immense range of the field and the great bulk and complexity of the data. But narrowness of outlook within divisions actually established, and the fact that certain of them, particularly the political and constitutional history of the state, had acquired exaggerated prestige and emphasis in academic teaching, have obscured a general view of the " social sphere " and of the ramifying character of its historical relations. One of the reasons for the rapid development of interest in Geography as an academic study has been an unformulated but strong reaction against the equation of History with some narrow branch of historical study.

Furthermore no principle is involved in the convention among academic historians, now fortunately obsolescent, that the most recent culture phase of Western civilisation, which extends into the present, is not a proper field for " historical " research. Students of recent and contemporary phases of aspects of their own culture

may indeed lack the perspective and disinterestedness obtainable by an investigator of a culture more remote ; but this is no justification for condemning efforts at objective analysis of the society in which the student himself is passing his existence. Indeed, several recognised branches of study, of which Human Geography is one and Economics another, have in fact had precisely this object in view.

But the fact that social studies by geographers have usually been characterised by deliberate concentration on the most recent cultural phase, with restriction of chronological depth, has in turn been mistaken for a principle, and Geography has been described as the study of the present, as opposed to History which is concerned with the study of the past. Such an assertion is based on a methodological confusion. Studies of the present necessarily involve study of development from the past, and there can be no theoretical limit to the chronological depth to which investigation may have to be extended in an attempt to explain the existence and interrelations of social activities existing in the present. Professor Fawcett recently provided an apt illustration of the impossibility of this achronic thesis when, in explaining present distributions of population, he invoked the familiar features of social change during and since the period of the Industrial Revolution. With reference to the urban populations of Britain he points out that

> " till about the middle of the nineteenth century . . . almost all the great natural increase of population from the beginning of the eighteenth century was absorbed by the growing towns. . . . The chief cause of these changes is undoubtedly the effect of changes in economic organisation and in the applications of mechanical power . . . ; a very large part of the work formerly done in separate houses has been transferred to factories. . . . All these transferred occupations, and the many newly developed ones, need the continued and ordered labour of a fairly large number of workers under one direction ; and hence they are essentially urban." [8]

This passage may also serve to make the point that there may be no intrinsic difference in nature or content between a generalisation which an historian would call " historical " and a geographer " geographical."

The term Historical Geography is now by general agreement applied to the study of the past Human Geography of " specific " regions. This is asserted, for example, in the Preface of *An Historical Geography of England before 1800*, in which is quoted Professor Taylor's dictum that Historical Geography " strictly speaking merely carries the geographer's study into the past." But it is now realised that a brief survey of physical conditions, combined with the perusal of a few general historical accounts of the appropriate period, is not a sufficient basis for a contribution to Historical Geography.

The student of past relations between cultures and physical conditions must discover, assess, and interpret original sources as does the political or diplomatic historian.

III

If it be granted that the problems involved in Human Geography lie within the general fields of Human History and Sociology, the relation with Physical Geography or the study of the " natural landscape " must be reconsidered. It has long been recognised that the explanation of physiographic forms, in the sense of accounting for their present physical characters and for their presence and interrelations in particular areas, must be achieved in terms of the historical processes of earth sculpture. W. M. Davis's well-known triad, " structure, process, stage," epitomises this genetic approach to the study of land forms which is being organised as a coherent discipline known as Geomorphology, or, in America, as Physiography. There is, however, an unresolved difficulty in connection with Davis's use of the term " explanatory description " in physical geography for a statement of " present conditions in terms of their origin." [9] Such an explanatory description of land forms which Davis and his followers consider desirable in regional description must be based on a genetic analysis of the land forms and can be reached only as a result of such an analysis. The first task presented by the orography of any area is therefore the performance of this genetic analysis, and the explanatory description, whatever the tense of its verbs, is a summary re-statement of it. Explanation, that is to say, must be in terms of the particular history of the latest phase of earth sculpture in the area. This involves reconstruction from structural and lithological evidence, together with deduction from physical laws, of the series of phases through which the landscape and its elements have passed.

Professor Ogilvie has recently re-stated the reasons for regarding Geomorphology or Physiography as logically a part of Geology, " a chapter of earth history which . . . ought to come from the pen of a geologist." [10] Davis has sought to establish a sharp distinction in physiographic studies between an " explanatory description " appropriate to Geography, and the " analytic " study on which it must be based. But he does not in fact dispose of the essential difficulty that a satisfactory " explanatory description " can only be given by the investigator who has carried out the genetic analysis, and will only be of direct value to the reader who is himself experienced in such analysis and is concerned with description in genetic terms. This coherence of " analysis " and " explanatory description " extends over the whole range of phenomena which may be the subject of geographical study.

In Human Geography we are concerned with certain human activities on the earth's surface, including adaptations to given

physical conditions and resources. For this enquiry genetic analysis of the physical landscape is irrelevant and a distraction, just as geological facts significant only for the earlier phases of earth history are, as Davis himself emphasised, irrelevant in Geomorphology. A genetic study of the evolution of land forms does not classify its facts in relation to human activities but with a different end in view. Just as satisfactory " explanatory description " of physiographic conditions involves genetic analysis of land forms, so " explanatory description " of the human occupation and use of a territory must be based on genetic analysis of the activities of the people concerned. In the latter case the problem is the explanation not of the land forms but of the human activities, and it is not the genetic but the " ecological " significance of the physical conditions that matters. Researches in Human Geography need not, and do not in practice, depend on the prior completion of a definitive geomorphological analysis of the area concerned. But if it be accepted that Human Geography as such is concerned not with the historical explanation of land forms but only with their present conditions in relation to human activities, it appears impossible to escape the inference that it can have no direct concern with the objectives of geomorphological study. Indeed it is theoretically improbable that the detailed topographical and structural features which merit the closest attention as historical evidence in Geomorphology will coincide with the features of greatest significance for the human occupation of the area.

There is no space here to consider in detail the position of climatological and bio-geographical studies. It can only be pointed out that the explanation of climatic phenomena lies in processes whose investigation and analysis constitute a branch of physics. Similarly the explanation of plant distributions and vegetation types involves a wide field of botanical knowledge and particularly of plant physiology and palaeo-botany. The explanatory generalisations in regional climatology and plant geography of which the geographer makes use are not, and cannot be, the results of his own investigations *qua* geographer of climatic and vegetational phenomena.

It is, nevertheless, rightly maintained that studies in Human Geography, however cultural they may be, do in fact involve an appreciation of the character of the physical environment. Lapses of economic and political historians are sometimes pointed to in support of the need for a knowledge of physical conditions and the investigation of their significance in human activity. This valid plea must not, however, be allowed to slide insensibly into a reaffirmation that geomorphology, climatology, and plant and animal ecology as such fall logically within the same field of study as Human Geography. They are distinct fields, research in which may have results that are of significance for all students of human societies. Actually the Human Geographer stands in need of a

knowledge of physical environment to precisely the same degree as do the Archaeologist, the Ethnographer, and the Economic Historian. All of them need knowledge, not of the evolution of landscape forms or of the applied physics involved in climatology, but of the findings of the agronomist, the land surveyor, and the prospector. They need knowledge of the empirically determined significance of physical conditions in human activity ; but for the most part they will have to seek this knowledge from the applied sciences.

It is not seriously suggested, for instance, that the determination of the effective climatic limits of a particular crop species under various conditions of agricultural practice could or should be made by the economic geographer. Experiment based on a specialised training in applied botany is pre-requisite, and the proper place for it is the agricultural research station. This situation holds for the whole field of applied science in relation to human needs. Geographical teaching has done a valuable service in calling attention to the necessity for using the results of applied science in a consideration of the relation of human activities to physical conditions ; but it would be disingenuous or naïve for the Human Geographer to claim the technical training and experience necessary to undertake the appropriate investigations.

IV

Geographical researches thus fall into two fields. One is the historical explanation of natural features observed on the surface of the earth and the formulation of scientific laws of which the particular relations of such features are special cases. Such studies involve throughout the application of the results of natural science which proceed from the isolation of less complex relations between phenomena which are themselves elements in those features. Thus for example the theory of the erosion cycle and its application in the elucidation of the geomorphology of any area in fact employs and assumes the validity of laws of mechanics and physical chemistry. The other field comprises historical explanation of certain classes of human activity and the formulation of sociological laws applicable to them.

It is now pertinent to enquire more closely into the kinds of human activity, or aspects of culture, with which geographers customarily concern themselves. It can readily be shown that Human Geography is mainly concerned with social activities and organisations related directly to the means of livelihood of communities. This is implicitly accepted as the central field. It is obvious in studies formally labelled Economic Geography, but it also motivates work in Regional and Historical Geography. For Regional Geography in the traditional sense of the study of " specific " regions is similarly concerned with problems arising

from the occurrence of particular livelihood techniques and organisations and their conditions. The recent report of a committee of the Geographical Association on " Classifications of Regions of the World " [11] implies, but does not perhaps sufficiently emphasise, the fact that in practice there is little attempt on the part of geographers to define, name, and delimit " specific " regions, that is, those which " possess a well-marked geographical individuality," unless they are concerned with them as " distinctive theatres of human activity." That the same emphasis is dominant in Historical Geography may be illustrated from the Preface to *An Historical Geography of England before 1800*, which takes as a text Jean Brunhes's statement :

> " L'homme entre en rapport avec le cadre naturel par les faits de travail, par la maison qu'il construit, par la route qu'il parcourt, par le champ qu'il cultive, par la carrière qu'il creuse, etc., . . . C'est, en effet, l'intermédiaire du travail et des conséquences directes de ce travail qui établit la vraie connexion entre la géographie et l'histoire."

This field to which the attention of Human Geography is directed, the explanatory description of the modes of livelihood of human groups, may more exactly and succinctly be termed Economy. The present economies of the technologically advanced Western civilisation are more particularly in the foreground of interest, while those of less advanced societies and of past culture phases in the Western world are often regarded as somewhat exotic specialisms. Data, whether physical or social, which do not appear to bear directly on livelihood, are felt to be alien to the enquiry. This attitude expresses in unformulated fashion the desire to isolate a sphere of closely interrelated physical, technological, and social conditions.

The complexity of human culture is such that no analysis can be attempted without successive concentration of attention on some segment of the ramifying relationships involved. Concentration on the facts and problems of Economy, given the conscious appreciation that understanding cannot be reached by a consideration of livelihood phenomena alone and that the totality of cultural conditions may have to be brought into view in a particular instance, is a rational mode of scholarly procedure. The term " Human Ecology " has frequently been proposed to indicate this field, and Professor Fleure has lately referred to the general assumption of its identity with Human Geography : " Human ecology is a province of study that we also designate by the title ' Human Geography.' " [12]

There is, however, a possible source of misunderstanding, in view of the established special sense of the term " ecology " in the biological sciences, in the nominal equation of biological adaptation, with cultural development. The dangers of the assumption that

cultural patterns can be satisfactorily explained as quasi-biological adaptations to physical conditions have already been indicated. It would seem safer to employ the cultural term " Economy " to connote the range of cultural phenomena involved. It is then possible to state the objective of Human Geography as the study of the character and development of Human Economy. The actual field may be described as including both the study of particular economics in specific areas or regions, and also the sociological investigation of human economy by comparative analysis of processes abstracted from particular economies, past and present. For it is reasonable that here, as in other fields of investigation of human society, both the historical and the sociological objectives should be combined, since those who have directly studied the relevant " events " and the manner whereby they may be reconstructed are best qualified by experience to test if not to formulate the relevant sociological principles. The most successful sociological generalisations will be made by those who have had experience of historical reconstruction in the field with which those generalisations are concerned.

It may be alleged that such a formulation of the content and objectives of what is generally understood by Human Geography makes this subject merely a branch of Economics. Such a conclusion will, however, depend entirely on the definition of the scope of Economics, and the reverse may in fact be claimed as more valid. Here again it is important to distinguish between the theoretical scope of Economics and the collection of special studies which in fact constitute the academic subject of that name. In the broadest sense Economics is but a special field within the general study of Human History and Sociology. As an academic study it has in fact been built out of a number of particular problems concerning certain features of the economy of peoples of modern Western civilisation. In so far as Human Geography is concerned with the economies of Western peoples in the modern period, coincidence in the field of study is obvious and inevitable.

The overlap between Economic History and Historical Geography is well recognised ; while Lord Stamp, in a recent address on " Geography and Economic Theory," [13] called attention to the demonstrable overlap between Economic Geography and much of what is generally known as Descriptive Economics. Referring to the trend within Economics towards " regional comparison " for the analysis of the problems of inequalities of economic standards in different areas, he points out that " Modern works on realistic economics contain much geographical matter, and those on commercial geography important summaries of economic factors." Using the term " geography " as equivalent to " physical environment," Lord Stamp also makes the point that natural controls are only one of three classes of conditions, the other two of which are historical factors and current valuations of utility. He suggests

that " geographical explanations of economic facts . . . are quite often reversible as economic explanations of geographical facts," and refers with approval to the conclusions of the American Economist Robinson, a generation ago, that Economic Geography and Economic Theory are essentially parts of a single field of study and that neither has significance without the other.

In practice the attention of professed Economists has been largely concentrated on the study of the financial organisation of modern industrial societies and on the elaboration of a system of economic theory which will formulate necessary relations between properties and processes abstracted from these organisations. The economic organisations of less advanced societies have been generally ignored, being regarded as more properly the concern of Ethnologists, whose field is that of " primitive " society as a whole. We have here but one more example of a familiar development in the history of learning. On the one hand, the growth of knowledge has proceeded from the concentration of attention on particular problems and the extension of interest from the original focus to related data and problems. On the other hand, a number of conventional fields of study have been independently mapped out and generally accepted without full consideration of their logical completeness or relative autonomy.

The student of Human Geography sets himself the task of analysing the basic character of existing economies and of evaluating the interrelated social processes and physical conditions that have determined them. He should attempt to define both the territories and the temporal phases in which particular economies have developed and been progressively modified. He should concern himself both with the relations of economy to other phases of the culture in which it manifests itself, and with the interdependencies expressed in trade, diffusion, and migration between the economies of different areas. With such an objective and programme the Geographer can take his place among the students of human society as a member of what should be a co-operating team. He will seek and make use of the findings of the applied scientists concerned with the physical and technological conditions on the one hand and of the economic technicians investigating the effects of fiscal and industrial organisation on the other. His results will, as Lord Stamp has suggested when discussing the relation of Economic Geography to Economic Theory, provide part of the comprehensive basis of organised data essential for the elaboration of a theoretical super-structure. " To attempt to instruct students in theoretical economics who know little of the world of industry from which these theories are derived is like attempting to make bricks without straw."

The Human Geographer will differ from most professed historians in the segment of social activity on which his attention is primarily focussed and in the relative shortness of the period

and the greater width of the territory and peoples he endeavours to hold in view. He will retain and emphasise his comprehensive world view as an essential basis for sound comparative judgment. His detailed studies will be " historical " in character, but the generalisations that emerge will provide one of the bases for the formulation of scientific sociological theory. He can in this way organise a body of knowledge concerning human society which may contribute to the foundations of sociological theory in the future.

V

If the term " geographical " is intended to refer to the part played by conditions of the natural environment in human affairs, then geographical study should be part and parcel of every investigation of society. Every study of human activities should include a consideration of physical conditions, space relations, and regional divisions, and every student of every phase of human history and social organisation should be a geographer in that sense. In these terms there cannot be pure Human Geography, for the complexity of the interaction of " environmental," " social," " psychological," and other factors is such that attempts at effective explanation must be based on an estimate of the weight of each and on their interconnections in each situation. To attempt to isolate and expound definitively the significance of any one in a particular context, without first making the comprehensive investigation, is to invite the well-recognised distortions of environmentalism, economic determinism, racialism, and so forth. But it is clear that under the banner of Human Geography much valuable work in the social-historical field has been achieved in the past, and that still more remains for the future. What is needed is clarity concerning subject matter and objectives.

It is necessary to recognise the distinction between the explanatory description of the natural surface features of the earth as such, and the explanation of the character and distribution of human activities. The former involves the historical discipline of geomorphology, together with analytical climatology based on the physics of the atmosphere, and, if biological phenomena be included, the results of both historical and scientific studies in botany and zoology. The latter theoretically involves the organisation of all historical and sociological knowledge, which is obviously too vast to provide the basis of a practical programme. But Human Geography has no need to submit to a self-imposed banishment on that account. The present academic subjects known as History, Sociology, Ethnology, Human Geography, and Economics are not autonomous fields to the degree that may be claimed for Physics or Botany. Their separation is largely one of convention, and results rather from the inelasticity of academic organisation than from any substantiated claim to utility in the advancement of

learning. Attempts to define content and defend frontiers lead either to logical contradictions or to a recognition that these subject labels, applied in any restrictive sense, are rather a source of confusion than a rational basis for the organisation of knowledge. The student of Human Geography can point already to substantial contributions in a field of study which has remained outside the conventional boundaries of academic history and of economic theory—the investigation of human economies as functioning entities in particular physical and cultural settings. Let him continue to claim and cultivate that field, but with full awareness of the objectives, of the range of cultural data involved, and of the close relations he should maintain with fellow workers in the social field.

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[9] See especially W. M. Davis, "The Systematic Description of Land Forms," *Geog. Journ.*, vol. 34, 1909, pp. 300-18; and "The Principles of Geographical Description," *Annals Ass. Amer. Geogs.*, 5, 1915, pp. 61-105.

[10] A. G. Ogilvie, "The Relations of Geology and Geography," *Geography*, 23, 1938, pp. 75 ff.

[11] *Geography*, 22, 1937, pp. 253-82.

[12] "Geography and the Scientific Movement," *Geography*, 22, 1937, p. 179.

[13] *Geography*, 22, 1937, pp. 1-14.

INDUSTRIAL PLANNING IN SCOTLAND: A REVIEW

Report on the Location of Industry: A survey of present trends in Great Britain affecting industrial location and regional economic development, with proposals for future policy. London: P E P (Political and Economic Planning), 16 Queen Anne's Gate, S.W. 1. 1939. *Price* 10*s.* 6*d.*

Scotland's Industrial Future: The Case for Planned Development. Glasgow: Scottish Economic Committee Publication. 1939. *Price* 1*s.*

Industrial Map of Scotland : Who's Who and Where of 2500 Industrial Firms. By C. A. Oakley. Edinburgh and London : Oliver and Boyd Ltd., 1939. *Price* 5*s.*

Act Now for the Highlands and Islands. By Sir Alexander MacEwen and John Lorne Campbell. Edinburgh and London : Oliver and Boyd Ltd. for the Belhaven Press, 1939. *Price* 1*s.* 6*d.*

Political and Economic Planning has given us so excellent and exhaustive a study of one of the problems confronting industry that its report calls rather for quotation than for comment. " The question of a policy for location of industry did not arise when populations were tied to the soil, nor to any serious extent so long as industrial civilisation depended largely upon power from coal and on transport by rail and water. It has only been made acute by the development of electric power, road transport and mass consumption demands, which have conferred great mobility on industry just at a time when increasing costs of public administration and services have made it far more important for the State to anticipate and perhaps guide where industry, and therefore population, are going to grow." Thus it would appear does civilisation outgrow the leading-strings of environment and geography become increasingly a study of Man's making rather than of Nature's. No one will dispute with the Commissioners for the Special Areas that the Victorian industrialist, in addition to leaving us a pile of savings which we have proceeded promptly to dissipate, left also a heritage of settlements soon to be in disaccord with their surroundings. Such are the towns that used to depend exclusively on the geographical distribution of some such resource as coal or iron. The location in the first place of Merthyr Tydfil in one of the least habitable regions of the British Isles is not a matter for surprise or recrimination : it was geographical necessity. But it is not so now. The concern of the Political and Economic Planning Group, of the Scottish Economic Committee, and of private individuals, is with the elimination and prevention of such anachronisms.

While, in the past, circumstances narrowly and obviously controlled the distribution of industry, it is submitted that in view of their present degree of complexity and instability no one but a Government Department can reasonably be expected to be both knowledgeable and influential enough to guide the location of industry. " The very large share of the real costs of industry which now falls not on the shareholder or entrepreneur, but on the national taxpayer or local ratepayer, makes it inevitable that central and local government shall, however belatedly and reluctantly, take some interest in the repercussions of industry's choice." It is pointed out (p. 21) that individual mistakes in the locating of big undertakings in the past have on occasion involved the central authority in proportionate relief schemes when the individual's judgement

has been proved wrong ; and that in future, therefore, the industrial entrepreneur should be advised and if necessary restrained from committing such mistakes, the social consequences of which may not be within his control. But in the approach to Communism entailed by the nationalisation of industry (already virtually a fact with regard to the resources of coal and electricity, for example), one regrets the foreshadowed subordination of the individual to " standardisation " and all that it implies. Why does the Nuffield Trust for the attraction of new industries to the Depressed Areas, having the same capital, stand in better repute than the (Government) Special Areas Loans Advisory Committee if not on account of the personal integrity of the guarantor and his trustees ?

It is a not unjustifiable attitude to regard the whole of Scotland as an incipient Distressed Area. Scotland was obliged by the War to concentrate her capital in the heavy industries; Scotland was more dependent than ever was England on the export markets denied to us through the growth of economic nationalism. Thus industrial Scotland (or three-quarters of the population) was harder hit by the Depression of 1931-3 than any comparable area of England, and, being small, was slower of recovery. Everything works against the " natural " or " automatic " rehabilitation of Distressed Areas, which offer a poor Consumer Market, cannot raise loans, cannot afford to subsidise, by a remission of the rates, the variety of industries they are wishful of attracting, and cannot lavish sums on self-advertisement. "The remains of the communities which depended on them, the schools where they were educated, the churches and chapels where they worshipped, the shops at which they shopped, the gas works from which they drew their heat and light, the pipes which brought their water and the sewers which removed their waste, bear visible testimony to the wastage of social resources which inevitably follows industrial decay." This poverty of living, this inability to finance existing amenities—let alone to extend them—repels private initiative and drives to the already prosperous districts the younger and more enterprising elements of the population.

How can the industrial belt of Scotland be made more permanently attractive ? To deal first with established industries, there is great need for modernisation. For instance, the pig-iron industry grew out of the proximity of the blackband ironstone to the hard splint coal in inland districts, but since the exhaustion of the original sources, better facilities for handling foreign ore at the ports are a necessity. While the principal blast furnaces are in the neighbourhoods of Shotts, Falkirk and Glasgow, the steel works are variously located round Motherwell, Wishaw, Cambuslang, Coatbridge, Mossend and Bathgate. (In this connection one could wish that Mr. Oakley, in compiling his index of firms and their addresses, had discriminated between the place of production and the administrative headquarters.) Such absence of integration

prohibits the new economy of working in hot metal. Most striking is the lack of co-operation in the use of coke oven gas : at the same time as the Scottish Economic Committee deplores the high price of pig iron on account of the lack of consumers for the gas automatically generated in the manufacture of coke, P E P reports that " In certain cases if special encouragement . . . were given . . . to enable local authorities to make provision for supplies of cheap coke oven gas to industry, *it would be of definite assistance in attracting new works* " !

The second desideratum is that too absolute a dependence upon one or few industries, or upon a single source of supply, should be avoided. The cultural stimulus and economic stability imparted by diversification of employment in any town or region should be self-evident. Southern Scotland is at present the region of least diversification in the United Kingdom, 39 per cent. of British industries being virtually unrepresented. Light engineering is conspicuously undeveloped, only one manufacturer of aircraft being listed in the *Industrial Map of Scotland.*

It has been emphasised already that a region once reduced to the verge of economic collapse cannot readily recuperate by its unaided efforts, and goes in fact from bad to worse, becoming a progressive charge upon the State. It is to the advantage of us all, therefore, that centres of population already endowed with immovable capital equipment should be assisted towards rebecoming a profitable investment rather than maintained in idleness. The greatest constructive advance in this direction is the Government-aided trading estate, for the institution of which provision is at present limited to areas actually distressed. The principle of the trading estate is that a public company, financed in part and at first by the Treasury, acquires after due consideration an extensive area (say 500 acres) suitable for industrial development. The provision or improvement of facilities, and the advertisement of sites sometimes including standard buildings, are undertaken at the expense of the Company. The prospective entrepreneur is thus saved a costly, lengthy and not always adequate advance survey of several competitive sites, and, provided the number of factories is sufficient, enjoys services which it might not be economic to supply to a single isolated site. That the Company may retain ultimate control by arranging long leases rather than selling outright is to the advantage of young industries beginning with small capital. And since a major reason for the location of the trading estate is the hope and expectation that it will increase employment, no difficulties in obtaining labour should arise, although the provision of working-class housing within daily distance has sometimes been neglected.

The trading estate is of more recent advent in Scotland than in England and is still represented on a large scale by a single example —North Hillington—in the vicinity of Glasgow. It is recommended

by both bodies that its use be extended and that future examples be not confined to the districts already scheduled as distressed.

With the prosperity of industrial Scotland is bound up the rehabilitation of the Highlands. Here again the lack of capital in circulation is conspicuous and the authors of *Act Now for the Highlands and Islands* urge cogently the desirability of an immediate loan raised by the central Government and applied in the directions previously outlined by a contributor to this *Magazine*. Radical and unpredictable changes in emphasis apart, however, it is not likely, in view of the co-existing higher standards of living, that to maintain the Highland way of life except as an integral part of the national life is ever again going to be an economic proposition.

An informative chapter (VII) in the P E P report concerns the strategic location of industry. It is observed that in the event of war the disorganisation of production by air attack would be of greater consequence than direct destruction. The dispersal and even duplication of centres of production and administration are on this account desirable. Perhaps strategic considerations will lead to the administrative decentralisation which would be so stimulating and so financially welcome in Scotland.

A DUTCH COLONIAL ATLAS

The Royal Netherlands Geographical Society, working in collaboration with the Netherlands Indian Topographical Service, is very much to be congratulated on having done for the Dutch colonial possessions what not every European country has done for the homeland. The *Atlas van Tropisch Nederland* * is in every respect worthy to take its place alongside the National Atlases of the world, and is obviously superior in accuracy and skill of depiction to anything previously published on the Netherlands overseas. There are thirty-one double-page plates, but no mere numerical statement can convey the wealth of intricate detail stored in subdivision and inset. About half the maps are physiographic. An interesting departure is the inclusion of eleven *Landschaftstypen* (not to mention many coastal and volcanic types), and later of fourteen *Kulturlandschaftstypen*. In default of a generalised land utilisation map, plate 7a, representing the vegetation cover of which we had no previous record, is particularly valuable for the impression it gives of the relatively slight extent to which land has been cleared of natural forest for cultivation. Light is thrown on the cultivated areas—Java and Madura, the "Inner" Provinces not shown in detail on this map—by two plates, 16a and b, which show soils on the scale of 1/2M, and, diagrammatically, the cultivated crops of those islands.

* Obtainable in Europe from Martinus Nijoff, 9 Lange Voorhout, The Hague. Price 16 guilders.

The administration by a handful of Europeans of a fertile tropical territory for the advantage of its native peoples has perhaps nowhere reached so high a standard of excellence as in Java. The maps in this atlas were not prepared before an accurate survey for the purposes of agricultural assessment had been undertaken ; and were further evidence of Dutch competence and interest necessary, the plates relating to the irrigation and forestry, the density of population and the railways in this island would supply it. The productiveness of Java does not enter extensively into world commerce only because the native economy is extremely simple. The agriculturalist himself consumes most of his produce, services are repaid in kind rather than in cash, and a favourable climate reduces to a minimum his requirements in the directions of housing and clothing. Government regulations now prevent the Javanese from impoverishing himself by selling his land outright ; so that the small area of European plantations (plate 16b, inset) encourages every effort to increase their yield per acre. This proportional diagram suggests better than the actual population-map the small number of resident Europeans (and Chinese) as compared with the overwhelming number of native Javanese * ; none of the maps manages to suggest the multiple croppings (now made possible in places by irrigation during the dry season) necessary for their support, although plate 16b conveys some idea of the diversity of crops which makes for a balanced diet for the multitude and has thus earned for Java its title to be " The Despair of Malthus." Other distributions one might have wished to see mapped are livestock (so inaccurately represented by statistics) and the incidence of certain diseases.

Although the main interest must lie with the bulk of the area in the East, the three plates relating to Surinam (Dutch Guiana) and the Netherlands West Indies are useful in their place ; and in addition to the sources, translations, etc., on the reverse of each plate, there are maps showing the relation of the Netherlands Empire to the rest of the world and a complete index.

Judging this atlas in conjunction with the voluminous reports of the research ship *Snellius*, and the expedition with which the annals of the recent session at Amsterdam of the International Geographical Congress were in print, we have nothing but praise for the industry with which a small country has in recent years contributed so large a body of scientific facts to the sum of published geographical knowledge.

* The actual proportions for the N.E.I. as a whole at the 1930 Census were :—

Natives	:	Other Asiatics	:	" Europeans "
250	:	5	:	1

PROCEEDINGS OF THE ROYAL SCOTTISH GEOGRAPHICAL SOCIETY

MEETINGS OF COUNCIL, May 9th and July 4th, 1939

Medal Awards, 1939 : *Livingstone Gold Medal for 1939* to be awarded to the Right Hon. Lord Hailey, K.S.C.I., K.C.I.E., for his direction of the African Research Survey under the auspices of the Royal Institute of International Affairs, and for the report entitled *An African Survey* (1938), a work which may be expected to guide enlightened European policy in Africa in future years.

Mungo Park Medal for 1939 to be awarded to Mr. E. B. Worthington, M.A., Ph.D., for his important share in the work of the African Research Survey under the auspices of the Royal Institute of International Affairs, and for his report entitled *Science in Africa* (1938), a work which may be expected to give a great impetus to research on an ecological basis in Africa.

The Society's *Research Medal for 1939* to be awarded to Professor Herbert John Fleure, D.Sc., F.R.S., Professor of Geography and Anthropology in the University of Manchester, for his many original contributions to geography and anthropology and his furtherance of these sciences in the British Isles.

Diploma of Fellowship.—The Diploma of Fellowship was awarded to Mr. T. G. Philip, M.A., Headmaster, Higher Grade School, Galston, Ayrshire, in recognition of work done in the course of geographical study in schools, particularly in Ayrshire.

Honorary Membership.—Honorary Membership was conferred on Captain Angus Buchanan, M.C., a Fellow and Medallist of the Society.

Presentations to the Library.—The following donors were thanked for their gifts to the Library :—Mr. R. B. Clark ; Dr. E. Wyllie Fenton ; Dr. F. M. Halley ; Mr. John Mathieson ; Mr. T. G. Philip ; Mr. R. T. Skinner ; Dr. D. Wallace Smith, Glasgow ; Dr. J. B. Tyrrell, Toronto ; Mr. C. B. Boog Watson ; Mrs. M. M. Watson, Aberdeen ; Dr. James Watt ; Mr. Robert Riddle ; and the Edinburgh Geological Society.

REVIEWS OF BOOKS

EUROPE

The Land of Britain. Part 3. *Sutherland.* By FRANK T. SMITH, M.Sc. London : Geographical Publications Ltd., for the Land Utilisation Survey, 1939. *Price 2s. 6d.*

This is one of a series of volumes, the object of which is to explain the nature of the land and its suitability for cultivation. In the case of Sutherland, an outline of the physical background is given, its area (2124 square miles), its population (16,100) and its surface relief. Only three peaks rise above 3000 feet, and the average elevation is 1000 feet. The rocks are chiefly Lewisian gneiss, Torridon sandstone, Durness limestone, and Cambrian quartzite. Next, the drainage and glaciation are dealt with, and a good outline map is given of the chief water-

courses. The climate is not severe, the records at Dunrobin Castle (for the thirty-four years ending 1915) showing an average temperature of 46·2° F. and an average rainfall of 31·65 inches. Deer forests cover 357,401 acres (1936), of which over half are at an elevation below 1000 feet.

In a chapter dealing with the evictions which took place during the years 1807-20, the author says that the Marquis and Lady Stafford determined upon a course " for the benefit of the people " (p. 172) ; but the sequel shows clearly that they as the owners reaped all the benefit. It is admitted that the evictions caused a certain amount of hardship, but, says the author, " there is no doubt that the severity of the remedy was fully justified by the gravity of the case." Was it ? I prefer the statement of the Chairman of the Deer Forest Commission, who says, " But when their action [the landowners'] is viewed now in the cold light of history, it is clear that the power of wholesale eviction by private persons ought never to have been permitted, and was one which was rendered doubly odious in this case by contrast with the patriarchal relations which existed between chieftain and clansman down to the rising of the '45."

On p. 157 the author says, " Along the track leading to Cape Wrath are a few crofts " ; but there is no track to Cape Wrath along the west coast. The road for transport to the lighthouse is from Keoldale Ferry on the north coast, and the cottages on the way are shepherds' dwellings ; as are also the cottages at Rhigolter, Carbreck and Balloch. None of these was a croft, neither are there brick and wooden houses at Durness, where the hotel was burnt down twenty years ago ; the present hotel is at Keoldale, two miles south-west from the village. Rispond (p. 156) is not a croft, and the island of Roan (Hoan) is not inhabited.

The volume contains tables and much useful information concerning the land and its uses. The population which numbered 25,793 in 1851 had decreased by 1931 to 16,100. J. M.

Introducing Britain. A Series of Talks supplied to broadcasting stations in U.S.A. and Canada. By various authors. London : George Allen and Unwin Ltd., 1938. *Price 7s. 6d.*

Some of the foremost of descriptive essayists have set out in this book to interpret in an intimate and vivid way the character and charm of Britain. All parts of the Isles and all phases of life are present : the metropolis and the great cities, the vitality of our urban life, the historic scenes that everywhere join this present age to the living and varied past, the villages and roads and all the grace and character of the country, with glimpses of the peculiar and typical customs descended to us from prehistory. Whatever is essential in Britain is here revealed. Indeed reading this book is like setting out on a pilgrimage, each chapter a new shrine and each shrine a new wonder. Anyone wanting to view the general pageant of Britain could have no more suggestive a guide. J. W. W.

A Survey of the Social Services in the Oxford District. I. *Economics and Government of a Changing Area.* Edited by Miss A. F. C. Bourdillon. London : Humphrey Milford at the Oxford University Press, 1938. *Price 15s.*

The study of regions is an important aspect of Geography, and Regional Surveys have, for various reasons, been undertaken in many parts of the country. There has been also much recent interest in the so-called southward movement of industry and in the establishment of new industries. The object of the Oxford Survey is to study the Social Services in the Oxford District in relation to industrial changes—a work of considerable interest to geographers.

The volume under review is the first of three, and is concerned primarily with economic tendencies and administrative organisation. The book is divided into three Parts. Part 1 is Introductory and deals with the Geography and Population of the area. Part 2, on Economics, embraces Industrial Immigration, Occupations, Industry, Unemployment, Shops and Agriculture. The third Part, of less direct interest to the geographer, describes the structure and finance of local government, and the maintenance of law and order. Naturally the book

contains a large number of maps, diagrams and statistics, which form the raw material from which conclusions can be drawn.

Briefly, the area is shown as one with the geographical advantage of nodality, which has assisted the development of a prosperous industry, in particular the motor industry. As a result of this industrial growth, the population has increased rapidly (mainly by immigration), long-term unemployment has been very small, and agriculture has declined in importance. The impact of the new on the old is a constantly recurring theme in history. The new may at first appear to be in direct opposition to the old, but while its intrusion may be resented it has to be accepted. Indeed, it is good that this should be so, for a static society would have little value. A time comes when a gradual synthesis of old and new begins, often to the advantage of the former. One has only to think, in the present case, of Lord Nuffield's munificence to the University of Oxford. In order that present and future changes may take place more smoothly than has often been the case in the past, it is vital that there should be planning based on the knowledge and experience that can be gained from studies, like the Oxford Survey, of an industrial revolution in progress. The Survey Committee and the authors of the book are to be congratulated on an invaluable piece of work presented in an interesting and readable manner. J. S. H.

Derbyshire (Shell Guide). Edited by CHRISTOPHER HOBHOUSE. London : Faber and Faber Ltd., 1939. *Price* 3*s.* 6*d.*

Even between stiff boards the Shell Guides are not quite such excellent value for 3s. 6d. as they were for 2s. 6d. In this instance it is the rich tapestry of historical association rather than the elusive charm of landscape that has been written up very attractively. The section on the great families who built the great houses, and the pages devoted to the old legal intricacies surrounding and surviving the mining of lead, remain vividly in the memory. If anything is to be regretted it is that in a book of such compass as necessarily to omit so much (notably the story of Eyam, to which the Black Death was sent with a parcel of cloth in the seventeenth century), repetition should not have been eliminated. Thus in the index there are three distinct references to Eldon Hole and more than one mention in the text of Doctor's Gate. There are two brilliantly effective photographs of the Winnats ; but in others of the illustrations a limestone landscape, of which the characteristic colouring is more easily developed than that of any shire in England by the camera, has been printed on shrimp pink paper. If logic be the guide of form, why not green ?—and leave pink for the counties that really are pink, like Warwick and the Eden valley.

The Charm of Belgium. By BRIAN LUNN. London : George G. Harrap and Co. Ltd., 1939. *Price* 8*s.* 6*d.*

This is a pleasantly-written book, complete with map, index and bibliography, and gives much valuable information on the history, architecture and art of the country. One would suggest that, in a future edition, when famous pictures are described in the text, reference might usefully be made by means of footnotes to the pages on which reproductions of them will be found (when such are given). The same might be done in the case of photographs of buildings. M. E. N.

Modern Sweden. By CICELY HAMILTON. London : J. M. Dent and Sons Ltd., 1939. *Price* 7*s.* 6*d.*

This compact volume of 226 pages, well printed and illustrated with eighteen photographs, is the latest of Miss Hamilton's surveys of modern European countries. In it she deals chiefly with the domestic life and the development of various industries. Stockholm, she tells us, a hundred years ago attracted so few visitors that when they arrived there was no place to put them. She rightly admires this wonderful and fascinating city, comments on how industries and pleasures rub shoulders, praises the manner in which the town is laid out, its buildings, baths, public and private, and the encouragement given by the

town authorities to private individuals to build their own houses. From Stockholm the author visited the Arctic mining town of Kiruna, where one of the largest iron ore deposits in the world is situated ; here the earth is so completely frozen during the winter that no earth burial can take place, and a crematorium has been erected to dispose of the dead.

Dealing with the economic and domestic life, Miss Hamilton notes that as in most European countries the birth-rate has declined ; but in Sweden an effort is made to encourage large families by giving a state allowance to those with three or more children. A chapter is devoted to " Sweden of Yesterday," an outline of its former greatness at a time when it was the most powerful of the Scandinavian nations. " Sweden in Europe " forms another chapter, in which the writer asks, " What Sweden will be in a few years' time, which of us will venture to predict with any confidence ? " " But if the gods are kindly and our civilised Europe survives : if Sweden remains, in essentials, what she is to-day, with her people masters of their own fate : then Sweden—(so it appears to the stranger)—is as good a place as any for a man to be born in " (p. 213).

J. M.

Travels in the North. By Karel Čapek. London : George Allen and Unwin Ltd., 1939. *Price 7s. 6d.*

This is the narrative of a round trip through Scandinavia, which the author and his wife made, beginning with Denmark, " a land of prosperity, a land of butter and of milk, a land of peace and of geniality with blue-eyed girls with milky complexions." Next Sweden, with its woods, lakes and capital of Stockholm, was visited, and the author shows in description and drawings the difference between the two countries and the advantages of each.

The route then goes to Oslo, and the description of a sail to North Cape contains some amusing passages besides giving the reader a good idea of the coast and fjords. It was the travellers' hard luck to have their enjoyment of the voyage partly spoiled by the general lack of consideration shown by a " collective gathering of some Christian society with its overwhelming sociability and breeziness."

The author's style is easy and humorous and the book is enriched by his own many delightful drawings. It would have been a great advantage if it had been accompanied by a map showing the route which Mr. and Mrs. Čapek followed.

E. S.

East of Athens. By Eric Gifford. London : The Travel Book Club, 1939. *Price 3s. 6d.*

This book chiefly consists of trivial personal experiences, especially the discomforts of " deck " travel in the Levant. The method is chronological (though no dates are given), with the result that there are three separate chapters on Athens merely because three different visits were paid there. There is no map or index, and the illustrations call for no remark. The mistakes throughout in grammar, spelling and punctuation are too numerous to be attributed to misprints.

M. E. N.

A Wayfarer in Yugoslavia. By Lovett Fielding Edwards. London : Methuen and Co. Ltd., 1939. *Price 8s. 6d.*

This volume is a valuable addition to a series that has a deservedly high reputation. The author has a profound knowledge of the country and its language, and is deeply interested in its history and architecture. Perhaps many readers will like best the early chapters on Dalmatia, but the book as a whole would be a useful companion to anyone visiting this post-war state. It contains two end-paper maps, some excellent illustrations, a bibliography and index, besides notes on the pronunciation of Yugoslav names.

M. E. N.

ASIA

Sheba's Daughters. By H. St. John Philby. London: Methuen and Co. Ltd., 1939. *Price* 21*s.*

Many important geographical journeys have been made in spite of governmental disapproval, and, the conditions in Southern Arabia being what they are, one is not altogether surprised that the Aden authorities are chary of granting to the traveller the official permission to enter. Mr. Philby did not seek that permission, and declares that if he had done so his request would have been refused. Unfortunately he has gone out of his way to enter into arguments about it, and throughout his book we have a train of references to the incompetence and lethargy of the authorities in Aden and the Protectorate. In one chapter copies of correspondence and argument fill many pages, lengthening a book already unduly long. Granting that Mr. Philby's Arab sympathies are naturally strong, we think it a pity that the record of a fine journey should have been marred by so evident an acrimony.

For the journey is indisputably of first-class importance. Hans Helfritz also entered the Hadhramaut without permission, doing so from Mukalla, east of Aden. Freya Stark appears to have had ample introductions, but on reaching Shebam had the misfortune to become ill, so that she was unable to visit Shabwa, that loadstone of Arabian travellers. Meantime Helfritz had entered the outskirts of the sacred village at night, only to be fired out of it next morning. Few places have been so rigidly closed to foreigners as this Shabwa (or Sheba), from which the early Queen set out to visit Solomon. Mr. Philby has not only entered it, but has been welcomed therein. The approach on this occasion was from the north-west; the return to Mecca. He now presents us with a map of the place and describes it at some length. It appears that after all it is disappointing archaeologically. Shabwa, Mr. Philby ascertained, stands 2980 feet above sea level, and he suggests that the Sheba wadi and the Hadhramaut wadi formed at one time a single river or flood channel. Not a single building is undamaged, nor a single inscription *in situ*. He was subjected to innumerable sand storms in this neighbourhood, and it appears clear that the water supply over a wide area is diminishing.

There is an extensive map at the end of the volume, and, as the country is unknown to Europeans, this map is important. We have had occasion to refer to it very many times, and with good daylight the names thereon can be read with difficulty, being almost microscopic. Two red lines cross the desert tract to the east from the borders of the Yemen, but there is no indication which is the outward and which the return track. Even a place such as Najran, which is usually shown on maps prior to Mr. Philby's journey, and which was practically the start of this journey and is described as the finest of Sheba's daughters, is indistinguishable or nearly so.

There seems little doubt that Mr. Philby's success was due in great part to his being a Moslem and a friend of King Ibn Sa'ud. All along the line he was welcomed by the leading Sultans and Shaikhs, entertained with the utmost hospitality, and regarded as an emissary of Ibn Sa'ud and his projected motor road through the Hadhramaut to Mecca. The statement, however, that " We had pioneered a motor route down the whole length of Arabia from north to south " is misleading. As the sub-title implies, the journey was across Southern Arabia. Mr. Philby reached the coast of the Indian Ocean at Shihr (about fifty miles east of Mukalla), and from Tarim he found a motor road ready constructed most of the way at the private expense of the Kaf family. Tarim appears to be regarded locally as the beauty spot, although Mr. Philby prefers Saiwun. At both places there are many villas and bungalows in gardens of comparatively recent date. The important commercial connection is with Java and Singapore, and the Malay language seems as familiar as Arabic.

On the return journey Mr. Philby made a detour to the south of nearly two hundred miles before resuming his journey towards the country which, we are

repeatedly assured, Ibn Sa'ud rules so well. The whole is a notable achievement, performed with two motor cars and a camel party. It appears that the cars made the journey without serious difficulty, although the party was much delayed through the " pick-up " car breaking an axle. It was this accident which provided Mr. Philby with the excuse to go to the coast at Shihr and then to Mukalla, where he got in touch with Aden. The authorities seem to have heaped coals of fire on his head by sending a new axle and altogether doing a good deal for him. W. L. C.

India of the Princes. By Rosita Forbes. London : The Travel Book Club, 1939. *Price* 3*s.* 6*d.*

This series of impressions of Indian states and their rulers comes from the pen of a widely travelled chronicler. In the volume are many descriptions of peoples and places some of whom, and of which, are well known to the world, others less so ; these studies claim to give the reader pictures—somewhat cinematographic, I fear—of the lives of these peoples and these places.

There is a blend of history and legend in the book : there are peeps into industrial, political and economic development ; there are records of conversations with all classes of society, and much more that ought to be most interesting and useful, but is not. I must confess to a feeling of monotony, even of boredom, before I got to the end. Whatever one's opinion of the writings of Miss Forbes, one is rarely *bored* by her books. Somehow this one just does not go. T. R.

India's North-West Frontier. By Sir William Barton. London : John Murray, 1939. *Price* 10*s.* 6*d.*

The North-West Province is divided from Afghanistan by the Durand Line, and the people are largely Pathans. Unfortunately there are nearly as many Pathans in the Province as in Afghanistan, and they have always been unfriendly to the British Government, favouring rather that of Kabul, although they object to pay the taxes of the Amir. It is perhaps more correct to say that they are always ready to fight for Islam. Their intense hatred of the Hindu is notorious, and probably it is only the presence of the British Raj that prevents them indulging in massacre. At the same time, a curious feature is that they are ready to accept the assistance of Gandhi to obtain the republic upon which they have set their hearts. It is accepted, however, that they will never consent to be governed by Hindu or Congress. Whether they can ever be brought to settle peaceably under British rule appears to be more than questionable—they have never done anything but cause trouble in the past, and might start a major war along the frontier at any time. Sir William Barton thinks they may be a most serious menace to our rule in India should we ever be at war with a Great Power, but offers no suggestion as to the solution of the problem they constitute.

The writer was for many years in the Indian Civil Service and is thoroughly conversant with his subject. The book, through no fault of his, is difficult for the average reader to follow—the different tribes and sections of tribes are innumerable and one is confused in trying to keep track of them and the places on the frontier where they belong. At the same time it is, of course, well worth careful study as dealing with what is possibly the most difficult and dangerous problem in the Empire. It is striking to read of the almost unbroken series of mistakes this country has made in the past in dealing with the Border peoples. There are many fine illustrations. S.

Language Hunting in the Karakoram. By E. O. Lorimer. London : George Allen and Unwin Ltd., 1939. *Price* 12*s.* 6*d.*

This title is rather misleading for, although language was thoroughly studied, Mrs. Lorimer's book is not concerned with academic linguistics. There is one chapter of general interest, " Learning an Unknown Language," which disposes effectively of the popular error that primitive people have a limited vocabulary

and an easily learnt language. The main part of the book is an account of the events leading up to the Lorimer expedition to the Karakoram, and of personal everyday experience on the journey and during a stay of over a year among the little-known peasant Burusho of Hunza. Those who require more detailed anthropological material can obtain it from Colonel Lorimer's writings. This does not mean that Mrs. Lorimer has little to say about the people. There is, indeed, much of interest, especially on home life and farming. The book is well written and beautifully illustrated. J. S. H.

The Changing Face of Bengal. By Radhakamal Mukerjee, M.A., Ph.D. Calcutta : The University, 1938.

These lectures are an eloquent plea for a thorough survey of the riverine changes of the Ganges, of the natural laws behind these changes, and of the part of man in them. The author, a much-travelled Bengali and a social economist, pleads for a wider than provincial consideration and control of one of the greatest river-basins in the world—the Ganges-Brahmaputra. The destruction of forests in the Himalayas and the plateau and the resultant floods affect irrigation in the upper Ganges plain and the floods of the middle Ganges. And both in turn are important factors in the silting up of rivers in western Bengal and their concentration in the eastern estuaries of the plain. In eastern Bengal the power of the floods, though beneficent on the whole—the growth of a sturdy population there contrasts with the arrested and malarial population of the " dead river " land further west—is such as to be destructive also.

The book is illustrated by twenty-three plates of maps of Bengal and its rivers from early times. Two or three of these, although the author modestly omits to say so, are old maps of his own finding in libraries in the Netherlands, and are here published for the first time. Professor Mukerjee is an economist who stresses the fundamental need for a geographical and regional basis for his own special studies, and pleads for their culmination in sociological understanding and action for human welfare. His book is warmly to be welcomed. A. G.

Ceylon. By Lord Holden. London : George Allen and Unwin Ltd., 1939. *Price* 10*s.* 6*d.*

Few places can equal in interest Ceylon, with its background of Ancient History and its fascinating though fatalistic religion. This book is well written and profusely illustrated, and should prove refreshing to those acquainted with the island. The first part deals mainly with the Lost Cities, and enough history is given to add zest to this already intensely interesting aspect of the subject. The book contains all the information an intending visitor should know, and its perusal beforehand should greatly add to the value of a tour in the land.

The second part gives itineraries which may well form the plan for an extensive tour. Few places of interest are left out, and the author's descriptions are interesting and easily read. Although the railways are of but limited use for such a tour, many of the places *can* be visited by rail and the scenery of some is truly magnificent. No able-bodied person should omit the ascent of Adam's Peak, which is best done by night, and which should prove an unique experience. Lord Holden is not apparently fascinated by waterfalls, as references to these, with which the island abounds, are scanty. R. R. E.

South of the Clouds. By Gerald Reitlinger. London : Faber and Faber Ltd., 1939. *Price* 15*s.*

This book has special interest because of its bearing on the present development of the approaches through Burma and India to the Western Border of China.

Mr. Reitlinger tells of the wanderlust which led him first to try to reach Sinkiang through north-west China, and on finding he could not do so, to propose to pass down the Western Border through the Kiarong country and so to reach the southern provinces. His book, on the contrary, describes a line of approach

from the other direction, beginning at Bangkok, passing to Hanoi, and then by the French railroad to Yün-nan city (now known as Kunming), whence the real start was made.

The chief interest of the journey lies in the descriptions of that little-known land where the great Yangtze, Salween and Mekong rivers apparently find their sources within forty miles of each other. Mr. Reitlinger gives very vivid descriptions of the rifts—rather than valleys—through which these rivers force their way, and illustrates their courses with exceptional photographs. An expert who knows the region well has described his photograph of " The Great Snow Mountain " as the best he has seen ; and we must also praise that remarkable view of the Yangtze as it flowed five thousand feet below the camera. The general descriptions of the routes followed are distinctly good, and the contour map makes both the terrain and the elevations of what one traveller called " those everlasting hills " clear to ordinary readers. How soon the great highway from Burma to the Yangtze will be complete is a question future years must solve.

Mr. Reitlinger's experiences among the different aboriginal tribesmen show a sympathetic understanding of their habits and customs, which evokes memories of the surprise shown by Baber when he discovered their separate existence in his first contacts with the Miao about half a century ago.

We commend this book with pleasure : it has definite value for any who may wish to follow the difficult route of Mr. Reitlinger's journeys. G.-B.

Japan in Transition. By Emil Lederer and Emy Lederer-Seidler. New Haven : Yale University Press ; and Humphrey Milford : Oxford University Press, 1938. *Price* 14*s.*

Though books on Japan are plentiful, the prominence of the Japanese in the Press to-day fully justifies the publication of this timely and scholarly addition to their number. The basis of it first appeared in Germany ten years ago, but it has been almost wholly re-written, " so as to include the political as well as the social developments of these last momentous and eventful years."

For a sympathetic understanding of the problems confronting Japan, in this period of transition as a world-power, which cannot properly be understood by the application of purely Western standards ; and indeed to grasp what is going on in the entire Orient, the book is invaluable.

It consists of ten lucidly written chapters. The first five deal with the Land, the Religion, the Cultural Development, the Language, the Conventional Form of the Japanese people ; then, on the basis of this analysis of the hereditary forces, the authors proceed to discuss in the remaining five chapters : the State—in China, the State—in Japan, Japan and the West, Japanese Foreign Policy, and Certain Basic Problems in Economic Development, " seeing these in the light of the special values that the Japanese feel compelled to follow."

Two paragraphs may be quoted as to the conclusions reached by the authors : " If the analysis in this book is correct, Japan is faced with what seem to be insurmountable difficulties. To preserve the essential substance of her character under the social and political conditions bound to come will tax to the utmost her genius for selection and assimilation. She appears to be struggling through a period that shatters the foundation of the Japanese spirit without giving in exchange anything more than technological guidance. Every friend of Japan will watch with anxiety whether she will succeed on a path which seems to border destruction and which there is no guide for traversing."

" But it is impossible to guess what may happen to Japan. It is scarcely conceivable that she can succeed in her efforts toward the domination of the Far East. And if she does not succeed it is scarcely conceivable that she can solve the deep-rooted problems that beset her at home—the tremendous pressure of population ; the amount of arable land per person scarcely larger than a tennis court, and its last foot cultivated with methodical skill through many generations without producing more than a bare subsistence ; the necessity of

importing the main raw materials and paying for them with the labour of poorly nourished workers ; a great part of the national dividend spent for the ' defence ' of a country which no one would attack ; an ancient culture which bequeaths its people pride and audacity, and a people ready to conquer the world and to dominate it but at the same time lured into an alien Western civilisation, difficult to grasp and embarrassing in its strangeness ; the ruling classes sensing the threat from within and having nothing to set against it but an ideology unintelligible to the uprooted masses and an armament against powers which month by month increase their strength. It may well be that the only possible solution for the nation is to transform itself into a new Japan that will have nothing in common with the old except a name."

The problem confronting Japan would appear to be threefold : (1) the economic necessity to expand if she is to feed her growing population and to find the raw materials essential to her industries ; (2) the psychological urge to retain her ancestral culture and mythical religion and her own peculiar type of life—between these two an inner conflict goes on in the Japanese consciousness, not yet reconciled ; and (3) her fear of Russia from her geographical position. It was this last that launched Japan as a world-power, and the successive steps are admirably traced in this book. But the climate of Manchuria is not attractive to Japanese immigrants, neither does it grow the rice or cotton Japan requires. It is too cold, hence her thrust southwards into the warmer provinces of China proper. By contrast China is rich where Japan is poor. With almost ten times her population her soil is amply sufficient to feed and clothe her people and rich in untapped mineral deposits. She too is in the throes of transition, and, with a like cultural inheritance which Japan borrowed from her, is confronted by precisely the same problem—that of adjusting herself to Western conditions. But in the Revolution of 1911 when she set up a Republic, she freed herself from the hampering ideologies of the past—her emperor-worship—akin to that of Japan. Always essentially democratic and pacific, the vastness of her empire making a freer life possible, she seems destined to succeed where Japan may fail. Her resistance to Japanese aggression so far has surprised none more than the Japanese themselves, who would be only too glad to get out of their present predicament without loss of face.

It is only fair to say that, while special attention has been given in this review to the political problem raised, namely, the future of Japan in the Far East, it has not been possible to convey any adequate conception of the range, the richness and the readableness of this book. It is singularly free from political bias, and markedly successful in probing into " the underlying imponderables " that have moulded and still influence the social life of this remarkable people, charming glimpses of whose happy and care-free life, in and out of doors, are found in abundance throughout its pages. To the painstaking reader it offers a rich reward, and cannot fail to evoke a measure of sympathy with the people in their present perplexing position. J. M. G.

Siberian Man and Mammoth. By E. W. Pfizenmayer. London and Glasgow : Blackie and Son Ltd., 1939. *Price* 12*s.* 6*d.*

This somewhat belated translation from the German describes two expeditions to the north of Siberia, one in 1901 and the other in 1908. The object in both cases was the excavation of mammoth remains which had been found, one on the Beresovka river and the other on the little Arctic river Sanga-Yurakh. Both had been discovered when the river banks slid down into the river bed.

The description of the excavation and handling of the remains is interesting and the scientific processes are explained in a way easily understood by the general reader. The author gives, too, a most meticulous account of the life, habits, customs, superstitions, food and so on of the various Siberian tribes among whom he sojourned, and in this respect the book is unlikely to be equalled.

It is astonishing to learn of the enormous trade in mammoth ivory which has been going on for generations. S.

Trailing Through Siberia. By Joseph Crad. London : The Travel Book Club, 1939. *Price* 3*s.* 6*d.*

The title of this book is misleading. In these days when Russia apart from the beaten tourist track is practically closed to the outside world, an intelligent account of travels through the vast Siberian territory would have been of supreme interest. There is little about Siberia, however, in this book, and that little is unilluminating. The author appears to have been in Alaska some thirty or forty years ago ; most of the book refers to that country. About this time—the exact period is not stated—he crossed the Behring Strait in winter and paid a short visit to the extreme north-eastern corner of Arctic Siberia. The Eskimo there, who appear to have been the only people he saw, are much the same as the North American Eskimo, and we learn nothing of the country or its conditions.

The book is full of mistakes in spelling, punctuation and grammar. We would suggest that in the case of writers naturally more used to pioneering than to the pen, the publishers' staff might with advantage correct them. In this respect we can only say that the book is slipshod. S.

AFRICA

Frontiers of Enchantment : an Artist's Adventures in Africa. By W. R. Leigh. London : George G. Harrap and Co. Ltd. *Price* 10*s.* 6*d.*

This is an unusually interesting type of travel book. The author was commissioned to go to Africa to paint its wild animals in their native environment for the " habitat " groups in the American Museum of Natural History. He fell completely under the spell of the land. To quote a few sentences : " It is good simply to be alive in Africa " ; " In Africa my spirit seems more at home than anywhere I have ever been " ; " It is a painter's paradise, few people dream of the beauty that is waiting for the right artist " ; " Africa is a marvellous virgin reservoir of incomparable inspiration for painters, poets, dramatists, novelists, sculptors and composers . . . it is to-day the world's most sublime theatre for romance and adventure." The only criticism one would make is that Mr. Leigh's " Africa " comprises certain districts in Kenya, Uganda, Tanganyika and the vicinity of Lake Kivu. There are other Africas. But within the regions he describes he saw remarkable scenery and a wide range of animal life—lions, leopards, baboons, elephants and lesser game—which, as an artist, he describes with colourful word and accurate delineation. The many pen-and-ink sketches which illustrate the book are indeed admirable and would alone make it a notable production. W. P. L.

The Bantu Tribes of South Africa. Vol. III, Section I. *The Ciskei and Southern Transkei Tribes (Xhosa and Thembu).* By W. G. Bennie and A. M. Duggan-Cronin. Cambridge : Deighton, Bell and Co. Ltd., 1939. *Price* 25*s.*

The short letterpress of this contribution to an established series is the least of it, but is of interest in its remarks on the Xosa and Tembu (for which we prefer the older and better-known spellings). The pronunciation marks are more confusing than helpful, and in any case the pronunciation of Kafir tongues can never be attained by signs. They require to be heard. There is an extensive bibliography.

The rest of the book is entrancing. It consists of plates from magnificent photographs by Mr. Duggan-Cronin, almost wholly of various types of the Tembu, Xosa and Nguni. They are quite the best of their kind we have seen, and give a clearer idea of these fine peoples than all the books ever written. Those fortunate enough to possess it will treasure this book for its really fine illustrations, which reflect the utmost credit on Mr. Duggan-Cronin and his assistants. S.

AMERICA

New York, City of Cities. By HULBERT FOOTNER. New York and London : J. B. Lippincott Co., 1937. *Price* 15*s.*

The author of this almost monumental book is, needless to say, a New Yorker, and he deals only in superlatives. Whether for magnificence, wealth, extent, sordidness, crime, police—for anything imaginable, in fact, the " city of cities " in Mr. Footner's opinion has the world beat. He would appear to have explored every park, street, building and alley, and his impressions are meticulously set out. The city's very vastness and the author's meticulousness are calculated completely to bewilder the average reader, and the book is most likely to interest those with some knowledge of the city itself. The numerous illustrations give a very good idea of its amazing architecture. S.

The Lawless Roads. By GRAHAM GREENE. London : Longmans, Green and Co. Ltd., 1939. *Price* 10*s.* 6*d.*

We have read this pathetic book with real interest. It is not easy to grasp completely the distress of mind in which Mr. Greene visited the less-known cities and the Indian peasantry of Mexico, only to have his evidently deep religious temperament shocked and hurt by contact with the intolerant destruction of practically all churches of the Roman faith, and the consequent expulsion of their priests, through the uncompromising hostility of the regime of Dictators Garrido and Cedillo.

The book gives detailed accounts of journeys which began at Laredo and extended through the tropical state of Tabasco, with a brief visit to the ruins of the great Indian temples of Palenque, described as " the enormous tombstones of history." Mr. Greene then passed into Chiapas state, with its high elevations and difficult climate, where he was still distressed by the same severe religious conditions. He returned from it to Mexico City and to Vera Cruz, whence he embarked on the homeward voyage.

Mr. Greene's reflections on religious troubles inevitably colour the whole of his book. His reports of the considerable absence of facilities for travel will not encourage prospective visitors, but we have nothing but praise for the undaunted spirit which ignored illness and discomfort in order to accomplish his difficult task ; also for his acute observation of men as well as of matters, as shown by the clever thumb-nail sketches which he has made of the various people whom he encountered. G.-B.

Voodoo Gods : an Inquiry into Native Myths and Magic in Jamaica and Haiti. By ZORA HURSTON. London : J. M. Dent and Sons Ltd., 1939. *Price* 15*s.*

From every point of view this is a remarkable and valuable contribution to our knowledge of the quasi-religious ideas and ceremonies that have developed amongst transplanted Africans in the West Indies. No greater contrast could be imagined than that between the contiguous islands of Jamaica and Haiti, the one British, civilised and Christian, the other a backward negro republic despite American influence, darkly pagan and superstitious, a land of mysteries which it is almost impossible for white observers to penetrate.

Miss Hurston, an American woman of colour, and an accomplished writer, spent a considerable time on both these islands for the purpose of studying the voodoo cult and associated practices. The Jamaican sketches are few and slight, probably because the outlawed obeahism there is now only the pallid ghost of voodooism. It is the Haitian chapters that are of special interest and value. Miss Hurston, as a coloured woman, was able to be present at the secret rites in which women play as important a part as men, to witness the dark ecstasies of the native mind, and to secure first-hand information regarding their weird beliefs and the medical power of local practitioners which even educated physicians cannot understand.

Miss Hurston is a trained anthropologist. The writer of this notice has also studied voodooism in Jamaica and Haiti, and can testify to the accuracy of all she writes and the reality of her local colour. The book contains 24 good photographs, which, however, do not represent voodoo scenes and personalities at their best—or worst. W. P. L.

South American Excursion. By Ernest Young. London : Edward Arnold and Co., 1939. *Price* 18*s.*

Mr. Young is a seasoned traveller. He has a shrewd and observant eye, the quality of quiet humour and gaiety, and a gift of style. His new book is one of exceptional interest and charm. Yet it is only the record of an unambitious journey in regions frequently traversed. He made his leisurely way round South America from Pernambuco to Trinidad by steamer, river, railway and car, and did so comfortably with little money and little Spanish, though apparently a knowledge of the latter was hardly necessary. He describes his experiences and evokes the distinctive atmosphere and picturesque easy-going civilisation of the continent in a most delightful way. If he had no outstanding adventures, he encountered plenty of minor incidents and discomforts which would have been disconcerting to any but so patient and experienced a Scout as himself.

In a volume of 360 pages there is not a commonplace page, and even readers without a geographic sense will have no inclination to lay it down once they begin. When they finish they will know more about Latin America and its peoples than they could learn from any number of guide-books or scientific works. It is amply provided with illustrations and sketch-maps. W. P. L.

POLAR REGIONS

Tracks in the Snow. By David Haig-Thomas. London : Hodder and Stoughton Ltd., 1939. *Price* 10*s.* 6*d.*

A hurried age, no less than the costs of publication, has reduced the polar narrative to little more than a short story in place of the former two volumes. In any case long sledge journeys have become almost a commonplace and there is little of misadventure and disaster to recount. Mr. Haig-Thomas acquired a taste for the Arctic when he was a member of Dr. Noel Humphrey's expedition to Etah and Ellesmere Land in 1934 and returned to the same scenes with his own small expedition in 1937. His insistence on the use of Eskimo technique in travelling is sound, but it is by no means new. As long ago as 1851 Dr. J. Rae, using the same technique, made Arctic journeys that have never been outrivalled. Mr. Haig-Thomas with one Eskimo companion made a notable journey when he went west from Etah over Smith Sound, Ellesmere Island and Axel Heiberg Island to Amund Ringnes Island, a total distance, with the return journey, of over 1500 miles. Such a journey, in past days of polar exploration, would have given material for a long and tedious volume : but those days are over. Mr. Haig-Thomas found a small new island and failed to find reported fossil remains of some large animal. It was a good journey and the account is lively and readable, with many observations on musk-oxen, wolves, hares and other Arctic life. But neither this journey nor that of the two other members of the expedition on the coast of Ellesmere Land seems to have achieved so much that the author is justified in remarking that the previous expedition on which he served " accomplished practically nothing." Each was useful but neither made discoveries of great significance. The book, which has several maps and some excellent illustrations, is both entertaining and ably written. R. N. R. B.

GENERAL

The Rape of the Earth : a World Survey of Soil Erosion. By G. V. Jacks, B.Sc., and R. O. Whyte, Ph.D. London : Faber and Faber Ltd., 1939. *Price* 21*s.*

The Meaning of Soil Erosion; and *The Erosion-Pastoral Problem of the Western Division of New South Wales*. By MACDONALD HOLMES, Ph.D. Sydney: University Publications in Geography, Nos. 1 and 2, 1938. *Price* 2*s*. 6*d*. and 2*s*. respectively.

To the general uncertainty which is the dominant characteristic of the contemporary world has been added a new fear, not bred of any sensational discovery, but arising from the growing knowledge of the extent of man's abuse of the land. The textbooks in physical geography were formerly accustomed to state, almost axiomatically, that land forms were abiding features, changed only by slow geological processes. Of recent years, observations made under diverse conditions of climate, soils and vegetation have revealed the error of this once fundamental assumption, and it has been necessary to coin the new phrase "man induced erosion" to designate the rapid transformation of the surface of the land which has resulted from the extension of cultivation and grazing in non-European environments.

Mr. G. V. Jacks, of the Imperial Bureau of Soil Science, and Dr. R. O. Whyte, of the Imperial Bureau of Pastures and Forage Crops, have gathered and collated the evidences of soil erosion from six continents, have reviewed the more important remedial measures taken, and have concluded with an examination of some of the social and political consequences of the devastation of the earth's soil resources. Supporting modern descriptions with precedents drawn from history, perhaps with an excess of "erosional determinism," they anticipate the ultimate results of the anarchy which modern methods of commercial agriculture and stock-raising have introduced into the delicately adjusted relationships which existed between climate, topography, soil and vegetation under natural or primitive conditions. They are convinced that mere improvements in farming technique offer no adequate solution to the problems which man has brought into being as a result of his exploitational adventurings, and they contend that soil technology, engineering and forestry will prove effective only when they are integrated into comprehensive regional plans which are directed towards the establishment of a new harmony between man and environment.

Despite the wide scope of their subject and the comparatively modest size of their book, the authors have eminently succeeded in conveying the full significance of soil wastage, as it affects the land, the people and the society. The vigorously written pages, some three hundred in number, are accompanied by seventy excellent photographs. It is to be regretted that there is but one map, and that no bibliography is included. The literature on soil erosion is now very considerable, but it is mostly to be found in technical journals and government publications, and a selective list of references would enable the reader to pursue topics which it has been possible to treat only briefly within the compass of this admirably balanced work.

The first of the two studies by Professor Holmes surveys the general environmental conditions relevant to the understanding of soil erosion in Australia, the stages in the development of the features of induced erosion, and some of the remedies which have been tried locally. He concludes with a few recommendations for a general policy of soil conservation. The second monograph introduces the important factor, only briefly discussed in the more general paper, of the spatial and temporal extent and intensity of man's use of the land and its relation to the erosion problem. The temper of the two studies is, on the whole, optimistic, and one might be led to conclude that in Australia, soil erosion is not so menacing as it appears to be in other continents (notably South Africa) where conditions are not wholly dissimilar. Such a conclusion does not accord with the opinions expressed by other observers who consider that Australia is threatened by "a danger which is progressively gathering momentum," and that the research and conservation programmes so far adopted are not nearly commensurate with the need.

G. B.

The German Colonial Claim. By the Rt. Hon. L. S. AMERY, M.P. London and Edinburgh : W. and R. Chambers Ltd., 1939. *Price* 7*s.* 6*d.*

Germany's colonial claim is one of the most serious problems affecting Anglo-German relations, and there is a considerable controversial literature on the subject. Mr. Amery has made an interesting contribution to this discussion. He examines the arguments advanced in favour of Germany's demand for the return of the colonies she held before the War and gives his reasons for rejecting them. Whether students who are interested in the controversy accept Mr. Amery's views or not, they will be grateful to him for the clearness with which he marshals his evidence and presents his conclusions. The account of Germany's acquisition of colonies in the third chapter suffers to some extent because the author relies too much upon Mr. A. J. P. Taylor's *Germany's First Bid for Colonies*—a monograph which is not without faults. The chapter on German colonial administration and ambitions gives a very unfavourable impression of the German treatment of natives. It is rather unfortunate that so much of the evidence comes from British official propaganda issued during the War. Mr. Amery's solution of the colonial problem is that Germany's economic grievances—real and alleged—might be met by establishing " a system of European preferences [which] would constitute the foundation of a really effective scheme of economic development, and if it were not world free trade, would at any rate be freer trade for a very large area of the world. The natural nucleus and centre of such a system would be Germany with her immense industrial productive power and home market of 80,000,000 consumers. . . ." W. O. H.

The Geography of Capitalism. By W. G. MOORE. London : Victor Gollancz Ltd., 1938. *Price* 1*s.* 6*d.*

The importance of this little book is not measured by the number of its pages. Mr. Moore has compiled a book of arresting interest to all students of contemporary world economics ; and it is generally recognised that economic difficulties are at the root of the political troubles of the world to-day. It is fascinating to read in such clear and everyday language how geography has decided the location of the great manufacturing industries of our own and other countries—how Lancashire attracted the cotton industry, Yorkshire the woollen, and so on. The exploitation of tropical and subtropical products, the appalling waste of valuable foods in some countries, and the famine for just those foods in others, production and poverty, the chaos of transport—all are brought home in a manner well repaying close study. Although Mr. Moore does not suggest it, his book compels admiration of the ruthless Soviet experiment which is trying to equalise production and consumption without diminishing either, and is indeed almost enough to convert a hardened old Tory to Communism. S.

Erkundung von Verkehrswegen in Neuländern. By M. DENGLER. Berlin : Verlag von Julius Springer, 1938. *Price* RM. 5.70.

This is a pocket textbook for the engineer called upon to reconnoitre for routes in unsurveyed countries. It is therefore mainly concerned with the instruments and methods of reconnaissance survey ; but it includes hints on other matters such as health and clothing in hot climates ; the recognition of rocks and their use in construction ; observation of surface features giving indication of prevailing climate and of warnings to the civil engineer in selecting routes ; and means of estimating the costs of construction. A. G. O.

The Wheel : Fifty Centuries of Transport. By VERNON SOMMERFIELD. London : Ivor Nicholson and Watson Ltd., 1938. *Price* 12*s.* 6*d.*

It is surprising to learn that primitive railways existed before the Christian Era ; that is, if the author's definition that ruts on a road mark the origin of railways be accepted. If, however, a rail is a bar supported at intervals, then

a distinction must be made between paved roads and railways. But wherever the dividing line may be, the author's researches into ancient history are none the less attractive.

" Railwayacs " will be interested in the early days of railways, and motorists in the development of cars, buses and tubes. A short attack upon working conditions a hundred and fifty years ago seems scarcely relevant : present-day standards will no doubt be condemned in 2039. In the concluding chapter an interesting suggestion is that of building motorways above the railways ; while this is, of course, possible, I am afraid the author underestimates the difficulties involved and the expense. There are over twenty interesting illustrations, most of them of an historical character. W. O. L.

BIOGRAPHY

Benjamin Franklin. By CARL VAN DOREN. London : Putnam and Co. Ltd., 1939. *Price* 15*s.*

Any library is well advised to have a copy of this work, for not only is it the life of one of America's greatest men, but it is a model of what a biography ought to be. It may or may not be found somewhat heavy in parts, but it is an amply documented statement by one who tries neither to gloss over faults nor to magnify virtues, but who makes a shrewd estimate of the character he has studied.

Several lives of Franklin have appeared, but none so full as this. The fact seems to be that his own *Autobiography* has been the basis of much writing, and that it was written before much of his life was accomplished, and therefore before many memorable years which were spent as Imperial prophet, revolutionary leader, diplomatist, scientist and sage. The *Autobiography* tells of his early life, his development as a printer in Philadelphia and later in Boston, Newport and New York, and of his many activities and interests, but not of the great work he did towards the end of his life. He died in 1790, and the *Autobiography* was written for the most part in 1771. His highest qualities were called forth after that as a peacemaker, a minister-plenipotentiary, and as a scientist in France.

Franklin was received with enthusiasm in France because of his already known experiments to prove that lightning is produced by electricity. He had an insatiable scientific curiosity, and a mind that engaged itself on all manner of things. He was over eighty when he made his final return across the Atlantic, and two days out, although harassed by the bungling of the Stamp Act in London and tired by the strain of dealing with unsympathetic ministers, he began the taking of sea-water temperatures which finally showed the existence of what we now call the Gulf Stream. He refused to patent the lightning conductor.

This is a clear and well-balanced account of the life condensed into a book of over 800 pages. The first thing the author says in his preface is that " It could twice as easily have been three times as long." It is also an example of splendid binding, for the book lies open at any page. The portraits are well reproduced, and both that used as the frontispiece, painted in 1783 by Joseph-Sifrede Duplessis and now in the New York Library, and that facing p. 364, by David Martin in London in 1767, are full of characterisation. W. L. C.

The Gateway to India : The Story of Methwold and Bombay. By A. R. INGRAM. London : Humphrey Milford at the Oxford University Press, 1938. *Price* 7*s.* 6*d.*

The East India Company was incorporated in 1600. William Methwold, when only twenty-five years of age, was appointed a factor and sailed from London to Surat in 1616. These were the days of small beginnings : the 1616 fleet consisted of five ships and a pinnace, and the factors were no more than visiting merchants who had to comply with the local Indian laws.

Methwold served at various trading posts up and down the west coast until

in 1623 he was obliged to return home to refute certain false charges brought against him. He remained in England for ten years, working occasionally in the Company's interest, finally gaining promotion and returning to India in 1633. In 1638 he was recalled to advise the Company in London, where his abilities attracted so much attention that he was offered the post of ambassador at Constantinople, which he declined, and he died in England in 1654.

The story of the life and work in these very early days is full of interest. After Methwold's death, the story of the Company is continued to 1668, when Bombay, which came into the possession of King Charles as part of his Queen's dowry, was gladly transferred from the King to the Company for a cash consideration. Thus was realised the dream of Methwold and the inauguration of the Gateway to India.

The author is to be congratulated on the very interesting result of his researches among the remaining records of the pioneers of the E.I.C. W. O. L.

"*Birdie*" *Bowers of the Antarctic.* By GEORGE SEAVER. London : John Murray, 1938. *Price* 10*s.* 6*d.*

Bowers was one of three who accompanied Scott on his last expedition to the South Pole and died with him almost in sight of safety. Mr. Seaver has told the story of his life from boyhood at Greenock, through his training on the *Worcester* and his experiences in the Indian Navy, to his tragic end. Most of the book consists of his own letters home to the mother and sister to whom he was devoted, and it is from comments in the letters and the reports of others that we are made conversant with his extraordinary cheery energy, great physical strength, cleverness and capacity for any job he ever undertook. Nothing could be too much for him, and Scott's own testimony showed him to have been invaluable throughout the last sad journey, of which there has been no more stirring account than Bowers' letters.

While Bowers was cast in a heroic mould and books have been written about his three companions, there has hitherto been none about one who was not the least of the party. Mr. Seaver has remedied this omission, and his book should be widely read and appreciated by all to whom heroism, courage, and entire unselfishness still have a meaning. S.

EDUCATIONAL TEXTBOOKS

Modern Geography. I. *The Foundations of Geography.* II. *The British Isles.* By PREECE and WOOD. London : University Tutorial Press Ltd., 1938. *Price* 3*s.* 6*d. each.*

(1) This clear, concise and interesting book is worthy of its title. It does deal with the essentials that form the foundation of a satisfactory study of the world and should be read early in the geography course and frequently referred to thereafter, in order that a sense of proportion may be maintained in regional studies of the Continents. Its contents include (*a*) the Ordnance Survey Map, with excellent exercises and diagrams ; (*b*) physical features and climate ; (*c*) the geographical background of man's demand for food, clothing, shelter, power and transport. D. Y.

(2) The British Isles are introduced as a whole from the points of view of build, natural divisions, climate and occupations, and then regionally and in detail for separate areas, industrial centres, road, rail and air communications, state of trade and population to date. The subject has been given most complete and exhaustive study, human and economic aspects have been well stressed, and the result is a most interesting and readable textbook. Throughout it is plentifully illustrated by maps, diagrams and modern photographs, which, in the hands of a teacher using an epidiascope, would make it a most valuable manual. An excellent list of revision and test questions is included.

K. E. C.